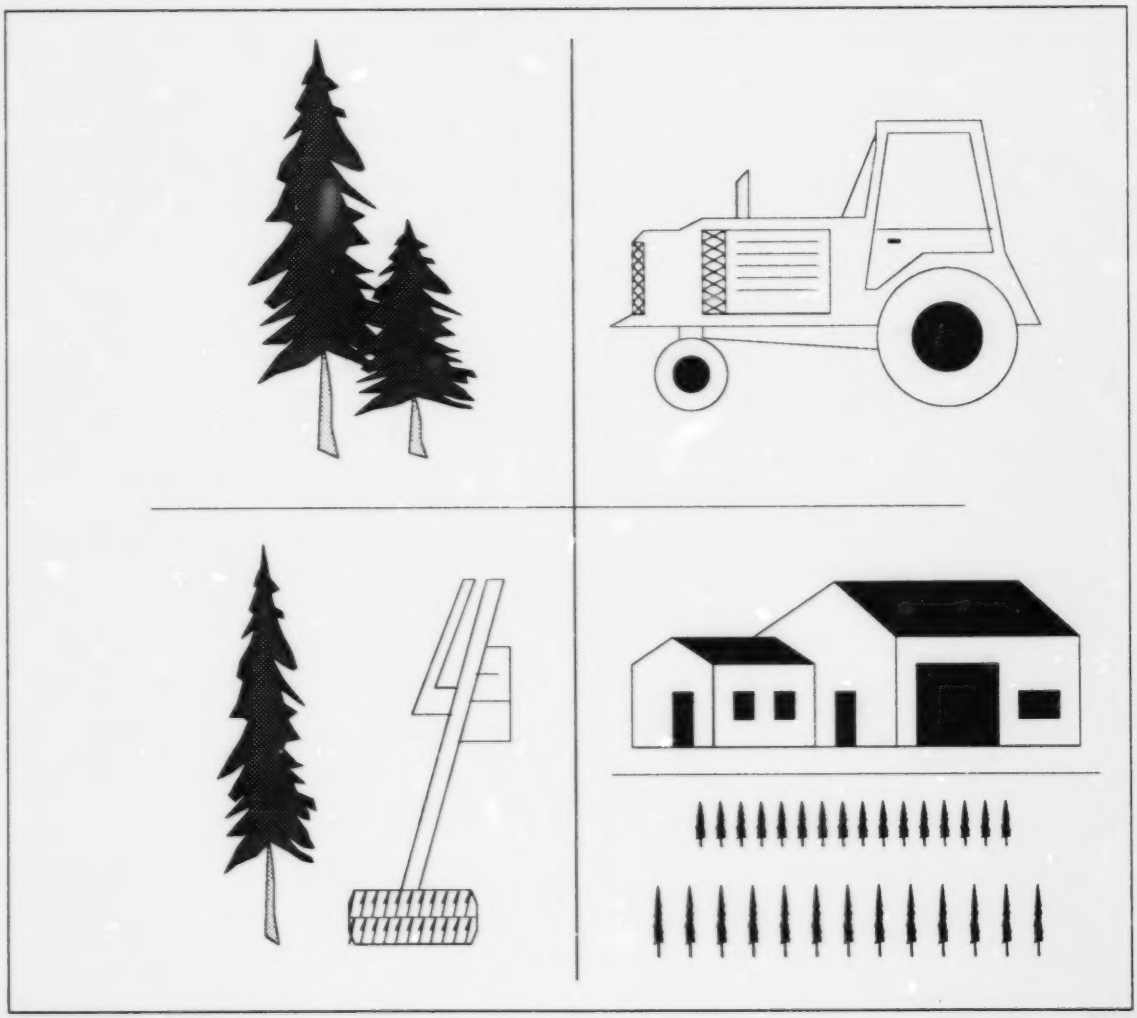
The silviculture labor force in eastern Ontario
A socio-economic profile

Lorenzo Rugo

Forestry Development Directorate • Information Report DPC-X-33



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A Socio-Economic Profile

Lorenzo Rugo

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Committed to human resource development...

Canada's competitive forest industry is dependent on a well-trained work force enhanced by year-round employment opportunities in forest management services.

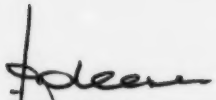
Such ongoing human resource development in forest management requires significant increases in labour quality ensuring long term-term employment opportunities and providing workers with skills to satisfy new job requirements. The key to human resource development is timely information on the needs, problems, and composition of the forestry labour force. Currently, the sector requires more technical forestry practices. As a result, those working in the field will need the commensurate skills.

This study is one example of how Forestry Canada is taking the lead to improve human resource information in forestry. A cooperative effort between Forestry Canada and the Ontario Ministry of Natural Resources, this initiative solicited needed human resource information using as the study group the silviculture labour force. it is a step in the right direction.

The data collected and employment categories analyzed are unique to this study. Information was solicited from silviculture workers, thereby providing a measure of their quality of life, economic well-being, labour quality, and occupational concerns. The employment categories addressed represent the first systematic attempt to define the wide array of silvicultural occupations within the forest sector.

This study and future studies are key to the formulation of effective and responsive labour policies. In addition, Forestry Canada, with other federal departments and provincial governments, is committed to providing an integrated forestry labour data base and developing human resources in forestry.

I trust that you will find this information useful and I encourage you to contact Forestry Canada's Forest Development Directorate for more information.



Frank Oberle
Minister of Forestry

Acknowledgments

I would like to extend special thanks to the Ontario Ministry of Natural Resources, especially Mr. John Oatway, regional director, and Brian Barkley, regional forester, in eastern Ontario for supporting this study. In addition, many thanks to all staff in the OMNR eastern region who participated in the success of this study.

To all field interviewers who had to undergo a variety of weather conditions and environmental situations, I extend a sincere appreciation for their committed efforts. Finally, to Bill Fasken of the OMNR, many thanks for a fine coordination effort.

From Forestry Canada, I extend sincere appreciation to Mimsie Rodrigue, director of Forest Labour Market Development Branch, Tony Hughes, director general of Forest Development Directorate, Jack Smyth, Ontario Region, Bob Woods, Federal Lands Branch, and John Forster, director of Forest Development, for their guidance and expertise in this study. In addition, thanks to all students, Vasi Warren, Ann-Marie Pelletier, and Angelo Barone for their countless hours of processing the data, and graphic design work.

Finally thanks to my indefatigable editor, Doyne Ahern, who turned this report into understandable prose.

Lorenzo Rugo
Economist
Forest Labor Market Development Branch
Forestry Canada

1990

Executive summary

In Canada, little information beyond two 1987 studies in British Columbia has been gathered on the labor force in the forest management services industry. This report augments this information with data gathered in eastern Ontario in a 1989 joint study by the Forest Labour Market Development Branch of Forestry Canada and the Ontario Ministry of Natural Resources. This information is a resource tool which can be used to develop forest management programs, develop human resources in forestry, evaluate employment creation/ improvement programs, and plan for longer term employment opportunities.

Silviculture workers were surveyed in four silviculture employment areas: forest renewal, site preparation, stand tending, and nursery activities. It was found that the eastern Ontario work force was composed mostly of young single males with few children to support, except those involved in nursery activities, who were more likely to be middle-aged females with one to three children. As a total group, they were fairly well educated; more than half in most groups had completed high school, from 10 to 25% had some forestry education, 32 to 67% had silviculture training, and 22 to 52% brought four or more seasons of experience to their 1989 jobs.

Generally the job market was only open to these workers between four and twelve weeks per year for 40 or more hours per week. Only stand tending workers were generally able to work more than 12 weeks depending on the snow fall and to earn more per year from silviculture work. In addition, some silviculture workers were multiskilled and able to remain employed for most of the year by moving from one silviculture employment group to another.

Although there are many approaches to developing human resources in forestry, this report highlights the possible development of a silviculture worker certification program. A silviculture worker certification program could be developed which delineates specific health and safety knowledge and occupational skills to which workers could aspire. The certification could be based on some combination of forestry education, silviculture training, and experience. Such certification could ensure a qualified pool of silviculture workers, improve worker productivity and income, improve safety, reduce forest management costs, and lower job turnover.

Introduction

The forest management services industry in Canada has evolved considerably since it's inception following the Canadian Forestry Convention of 1906. This convention formed the basis for the Canadian conservation movement from which four forest management principles evolved: Crown ownership of forests, protection of the forests from fire and insects, greater public education about forestry, and the promotion of an extensive tree planting program.

Information on Canada's forest resources and the development of these resources is available, especially in the areas of silviculture, forest protection, forest access, and forest research and development. Reports concentrate mainly on the results of these activities such as the number of hectares planted or stumpage fees collected. The cost of these activities in terms of capital investment, energy and especially labor is not well documented.

Labor represents a key component of most forest management activities. Existing data describing, quantifying, and analyzing labor within this industry are limited and concentrated in a few provinces. In addition, these sources cover a narrow range of labor force types and socio-economic data categories.

Recent studies on the use of human resources within the forest management services industry include that of G. Fraser and W. Howard, 1987, and the Silviculture Joint Adjustment Committee, B.C., 1988. The first reported social and economic information on planting contracts and workers employed to plant trees in British Columbia. The latter provided information on the B.C. silviculture labor force and made recommendations for improving the use of human resources in the B.C. forest sector. While these studies contribute to understanding problems surrounding silviculture workers, they are insufficient for future planning.

This inadequate labor database hampers forest sector decision-making at the local, regional, provincial, and national levels. Questions concerning the effect of employment programs, employment opportunities, and the supply of qualified workers to meet the growing demand for forest management work need to be addressed. This study provides some information on the silviculture labour force that will be useful in four areas.

1. Employment programs

Millions of dollars have been allocated to employment programs without adequate information on the effect these allocations have had on employment in regional and local economies. This situation has arisen, in part, from the fact that no socio-economic database on the forest management services industry exists against which program expenditures can be measured.

2. Employment opportunities

Few studies have been conducted in Canada to forecast the demand for forest management workers. Numerous economic and political influences affected the 1980s such as increased trade protectionism, strong international trading competition, and technological innovations. This has prompted Canadian forest product firms to streamline operations. In the logging industry, for instance, the move has been toward more capital intensive operations. The extent to which similar changes are occurring within the forest management services industry is not known. Information that would explain changes in the demand for forest management workers does not exist.

3. Forest management planning

Substantial funds have been allocated to Canada's forest management programs. Careful use of this funding and the concomitant benefits of increased wood supply are important issues. Decisions must properly balance resources, energy, technology, infrastructure, and labor. Determining labor requirements poses little problem, but fulfilling them, particularly with skilled workers, does. The extent to which the labor force is able to supply present and future needs is not known.

4. Cost effectiveness practices:

Forest management planning in Canada requires meeting two disparate objectives. The government policy of fiscal restraint and industrial expenditure constraints must be balanced against an increasing public demand to manage the nation's forest resources. Specifically, foresters must treat the maximum number of hectares while minimizing costs.

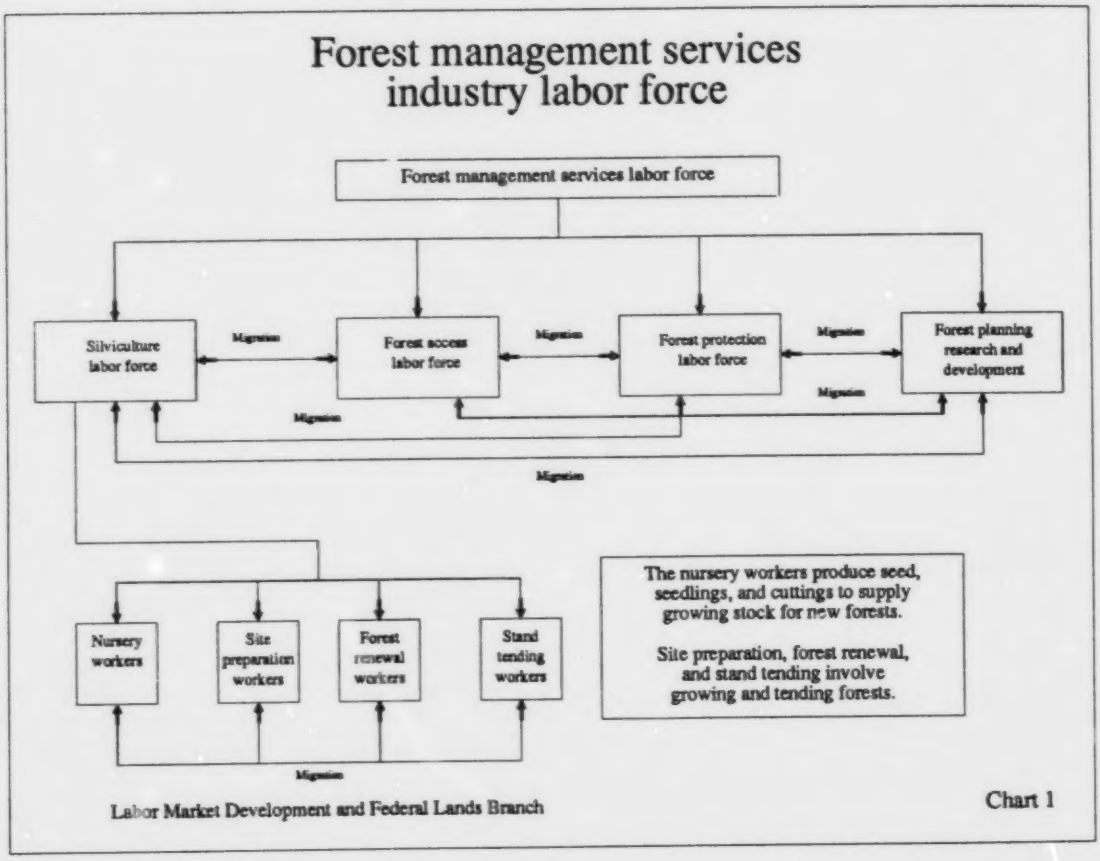
Labor is the largest cost of most forest management activities. Clearly then, improving labor quality is one way to reduce the cost of silviculture and treat the maximum number of hectares through silviculture. Trained tree planters, for example, could reduce seedling mortality with appropriate planting techniques. This in turn would reduce the need for refill stock and the labor for replacing dead seedlings.

Determining the labor quality of forest workers would permit an assessment of the training and experience of workers and permit the development of programs designed to meet specific, identified needs. Such information does not exist.

Comprehensive socio-economic information is needed to understand and respond knowledgeably to questions concerning Canada's forest management workers. In addition, in order to identify the needs of specific workers, it is necessary to develop an

occupational classification system for forest management workers (chart 1). Studying one segment of this occupational classification system, namely the silviculture labor force, this study collected socio-economic information on this labor group.

This study was conducted in the eastern administrative region of the Ontario Ministry of Natural Resources (OMNR) during the 1989 forest management season. It focuses on four silviculture employment groups identified as forest renewal, site preparation, stand tending, and nursery.



Objective and Methodology

Chapter I

Objective

Forestry Canada and the Ontario Ministry of Natural Resources cooperated to undertake a study of silviculture workers to:

1. develop a socio-economic profile on the silviculture labor force in eastern Ontario which could be used to:
   a) measure the effect of silviculture on employment;
   b) prepare information that can be used to enhance training and education of silviculture workers;
   c) respond to joint interdepartmental opportunities for employment creation programs; and
   d) to support future labor productivity studies.
2. develop a database that can be used to track socio-economic trends in this labor force.

Methodology and questionnaire design

Questionnaires were used to solicit socio-economic information from silviculture workers in forest renewal, site preparation, stand tending and nurseries. Extensive care was taken in formulating questions to ensure easy comprehension, thereby increasing the probability of a high response rate. A series of concerns were addressed before any item was included in the final questionnaire. For example, was the information available in other forms, was the item relevant to the purpose of the study, and could it be related to other items to extend the meaningfulness of the study. The relevant questions were ranked by order of importance, leaving the more sensitive questions, such as earnings per year, near the end of the questionnaire.

An interviewer administered the questionnaire to silviculture workers in group sessions at the work site. This method was chosen to ensure a high response rate. It provided the respondents with a psychological encouragement and improved their willingness to answer.

Forestry Canada's headquarters division coordinated the survey. The Ontario Ministry of Natural Resources provided an advisory/consultant role (Chart 2).

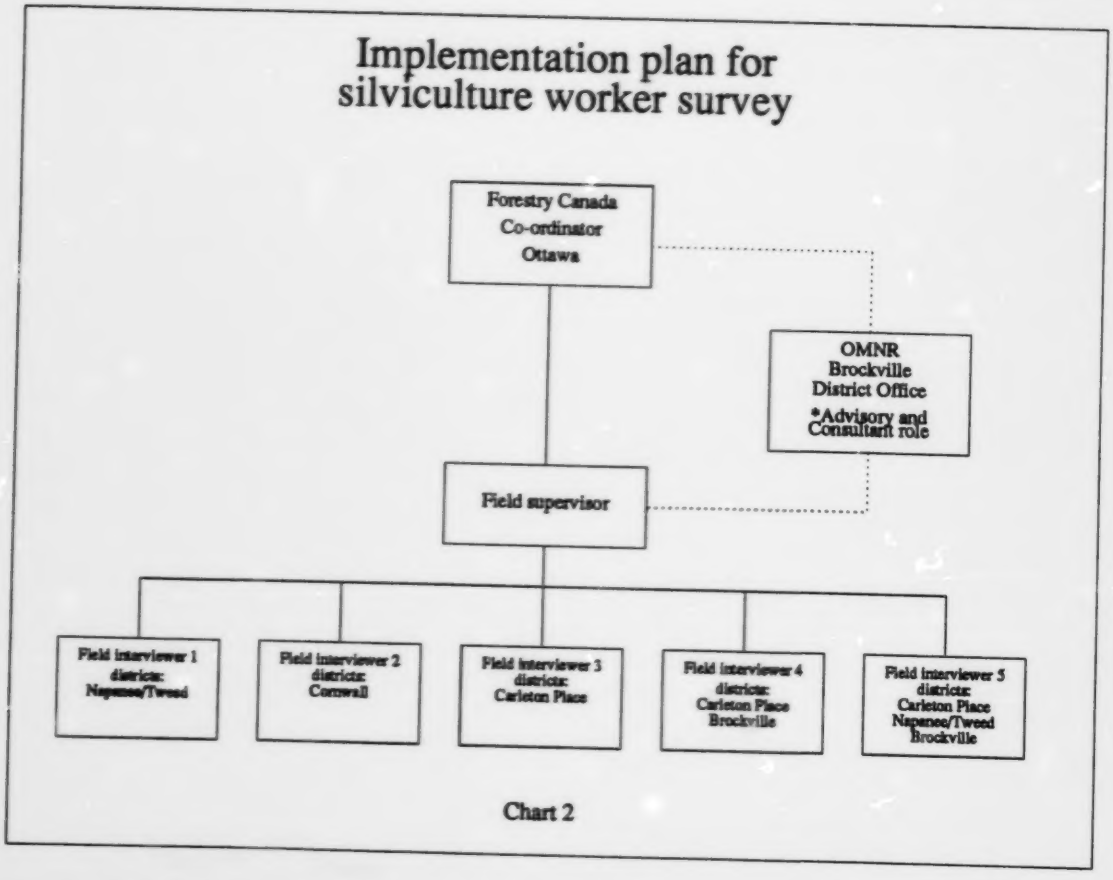

Implementation plan for silviculture worker survey
Forestry Canada Co-ordinator Ottawa
OMNR Brockville District Office
*Advisory and Consultant role
Field supervisor
Field interviewer 1 district: Napanee/Tweed
Field interviewer 2 district: Cornwall
Field interviewer 3 district: Carleton Place
Field interviewer 4 district: Carleton Place Brockville
Field interviewer 5 district: Carleton Place Napanee/Tweed Brockville

Chart 2

One OMNR field supervisor and five field interviewers collected the information. The field supervisor from OMNR organized the work groups by handling the assignments, reviewing the completed work, and serving as a liaison with Forestry Canada. The five interviewers were responsible for collecting the completed questionnaires, answering any questions related to the survey, and augmenting good public relations with the work crews.

The field supervisor was an experienced forester, familiar with forest management practices in eastern Ontario. Five interviewers were experienced foresters from the area. These interviewers were chosen because they were well informed on silviculture matters and could commandeer the respect of field crews.

Survey area

The eastern administrative region of the Ontario Ministry of Natural Resources encompasses the Brockville, Cornwall, Carleton Place, and Tweed/Napanee forest management districts (see map). The region encompasses 2,550,000 hectares, of which 891,000 hectares are productive forests.

Employees in the Kemptville nursery, located 40 km south of Ottawa, were the nursery workers surveyed. It is one of the larger nursery complexes owned and operated by the Ontario Ministry of Natural Resources. Their primary products are red and eastern white pine bare-root seedlings. Production capacity is approximately 12 million bare-root seedlings per year. Container seedling production exists, producing approximately 200,000 seedlings per year.

Survey population

The relatively small survey area allowed 100% coverage of all silviculture workers employed in the region. Tables 1 through 4 show labor crew type, forest land base, and forest management program for each of the four employment categories and forest management districts.

Table 1
Forest Renewal

Forest management district	Labor crews	Labor crew type			Forest land tenure			Forest management program				
		C. A.	Private contractor	MNR	Private	Crown	Agreement forest	WIA	C. A.	Domtar tree farm	Crown	Private freehold
		#	#	#	#	#	#	#	#	#	#	#
Cornwall	11	1	9	1	11	0	0	11	0	0	0	0
Brockville	7	0	6	1	4	3	0	4	0	0	3	0
Carleton Place	9	0	8	1	8	1	0	8	0	1	0	0
Tweed/Napanee	12	4	8	0	9	2	1	6	2	0	2	2

Table 2
Site Preparation

Forest management district	Labor crews	Labor crew type			Forest land tenure			Forest management program				
		C. A.	Private contractor	MNR	Private	Crown	Agreement forest	WIA	C. A.	Domtar tree farm	Crown	Private freehold
		#	#	#	#	#	#	#	#	#	#	#
Cornwall	3	0	2	1	1	1	1	0	0	2	1	0
Brockville	2	0	1	1	1	1	0	1	0	0	1	0
Carleton Place	5	1	2	2	3	1	1	3	1	0	1	0
Tweed/Napanee	2	0	2	0	0	2	0	0	0	0	2	0

WIA: Woodlot Improvement Agreement
C.A.: Conservation Authority

Table 3
Stand Tending

Forest management district	Labor crews	Labor crew type			Forest land tenure			Forest management program				
		C. A.	Private contractor	MNR	Private	Crown	Agreement forest	WIA	C. A.	Domtar tree farm	Crown	Private freehold
		#	#	#	#	#	#	#	#	#	#	#
Cornwall	5	0	3	2	3	0	2	2	2	1	0	0
Brockville	1	0	0	1	1	0	0	1	0	0	0	0
Carleton Place	4	0	1	3	2	0	2	2	0	0	0	2
Tweed/Napanee	3	0	2	1	2	1	0	2	0	0	1	0

Table 4
Nursery

Forest management district	Labor crews	Labor crew type			Forest land tenure		
		C. A.	Private contractor	MNR	Private	Crown	Agreement forest
		#	#	#	#	#	#
Brockville	7	0	6	1	0	7	0

WIA: Woodlot Improvement Agreement
C.A.: Conservation Authority

Timing

The labor force survey coincided with the timing of forest management activities in eastern Ontario (chart 3) which was determined by biology and climate. The best time to interview the respondents was in the morning when the crews had just arrived or on rest breaks. These times did not interfere with the work schedule whereas at the end of the day workers were more interested in going home than filling out a questionnaire.

Silviculture worker questionnaire

The worker questionnaire divided 36 multiple-choice questions into four categories: personal, social, economic, and occupational. A 37th question allowed a subjective response on worker concerns. The questionnaire required less than 10 minutes to complete. The four categories were:

Personal data

Basic personal data such as sex, age, and marital status information permitted an assessment of the human resources involved in silviculture.

Social data

Items such as housing provided information to assess the quality of life of silviculture workers.

Economic data

Income, marketable skills, and employment history information permitted assessment of the economic welfare of silviculture workers.

Occupational data

Worker aspiration, degree of job security and satisfaction information permitted assessment of subjective problems that may need attention.

Response rate

Interviewers reported excellent cooperation from workers. They were pleased to answer the questionnaire and commented that they were glad there was an interest in their well-being. Most answered the English questionnaire, although, there were some French respondents. Literacy difficulties posed no real problem. The response rate was calculated by dividing the number of respondents by the crew size on the job site. Table 5 shows the average response rates by employment group.

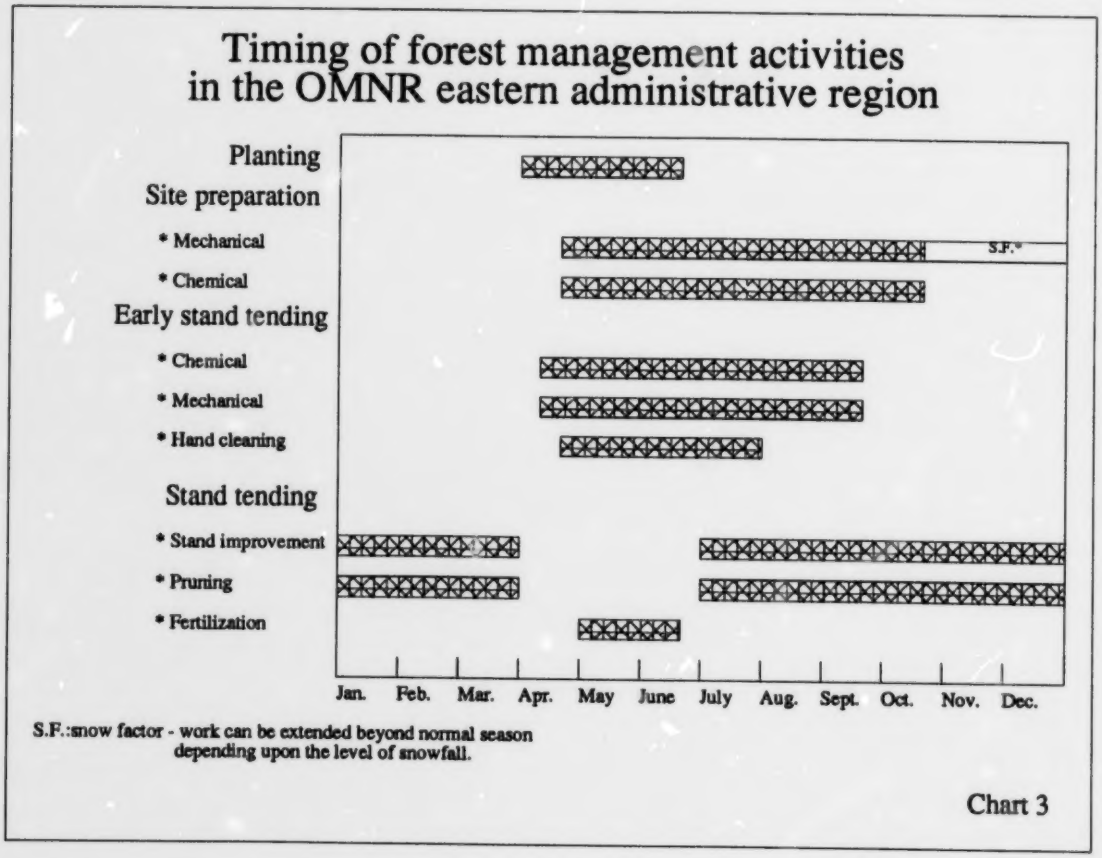


Table 5

Response rates by employment group

Silviculture employment group	Average%
Forest renewal	98
Site preparation	100
Stand tending	96
Nursery	93

Silviculture worker profile: introduction

Using the data collected by the silviculture labor survey, silviculture workers were analyzed both quantitatively and qualitatively. The quantitative analysis considered, for example, income, hours of work, wage types, and labor migration. The qualitative analysis concerned the demographic composition, human resource investment, and occupational aspirations.

Quantitative analysis

Income

The survey showed gross income, silviculture income, and additional income. This permitted calculating silviculture income as a percentage of gross income. Gross income is the total from all sources, including government welfare payments. The additional income question identified the primary income source when not derived from silviculture.

Hours of work and wages

The duration of silviculture employment and the method of payment were surveyed. Operators use a variety of methods to calculate pay including hours-per-day, hours-per-week, and weeks-per-year. Wages may be offered according to time worked (hourly), work completed (piece), or a fixed amount (salary). The type of compensation offered can influence labor productivity, efficiency, and profitability.

Silviculture labor migration

Labor migration, movement from one employment group to another, provides an insight into the degree of workers' attachment to their jobs and the factors that may induce them to move. A variety of factors can cause voluntary or involuntary migration such as wage differentials, age, geography, and the unemployment rate. Workers may choose to move because they are dissatisfied with their present job or be forced to change jobs because they were dismissed.

The survey differentiated workers migrating among employment groups in four ways: new entrants (those with some experience in some form of silviculture, but new to the present employment category), absolutely new entrants (no experience in any form of silviculture), relatively new entrants (those with experience in the employment category but who did not work in silviculture in 1988), and veterans (those with experience in the employment category who did work in silviculture in 1988 and returned to work in 1989.)

Qualitative analysis

Labor demographics

The labor analysis compared such variables such as sex and age distribution in the labor force. In addition, labor statistics provide the basis for comparisons between forestry and non-forestry workers.

Human resource analysis

The human resource analysis reviews the labor quality of a working population. Formal education, job training, and experience can be used to determine workers' ability to perform the job. This classical approach for assessing labor quality was adopted in this study.

An analysis of human resource investments can often indicate reasons for wage differentials by age group and employment categories. It facilitates determining how much capital should to be devoted to education and training compared to other labor investments.

Education, the development of character and mental abilities, is a major form of human resource investment. It determines the worker's potential marketability, mobility, and productivity. Education increases the value of workers in terms of the services that can be offered to the employer, the job opportunities available to them, and it influences their production.

Education can be either general and specialized. A general education is not necessarily job specific while a specialized education provides skills that are job specific. The survey assessed labor quality based upon education classified as formal (general) and forestry (specific).

Training, an addition or alternative to formal education, is another major form of human resource investment. Like education, training can be both general and specific. General training can be used anywhere, not just in the firms that provide the training. Specific training, however, is useful only in the company that provided the training . The distinction between general and specific training can sometimes be difficult to make. Training may contain elements of both.

Moreover, training, once deemed specific, may in fact be transferable to the production process of another firm.

Experience, the accumulation of ability from on-the-job involvement, is the third and often overlooked form of human resource investment. Monitoring the experience of workers provides an indication of the new workers in an employment category, job turnover rates, and worker retention.

Worker aspirations

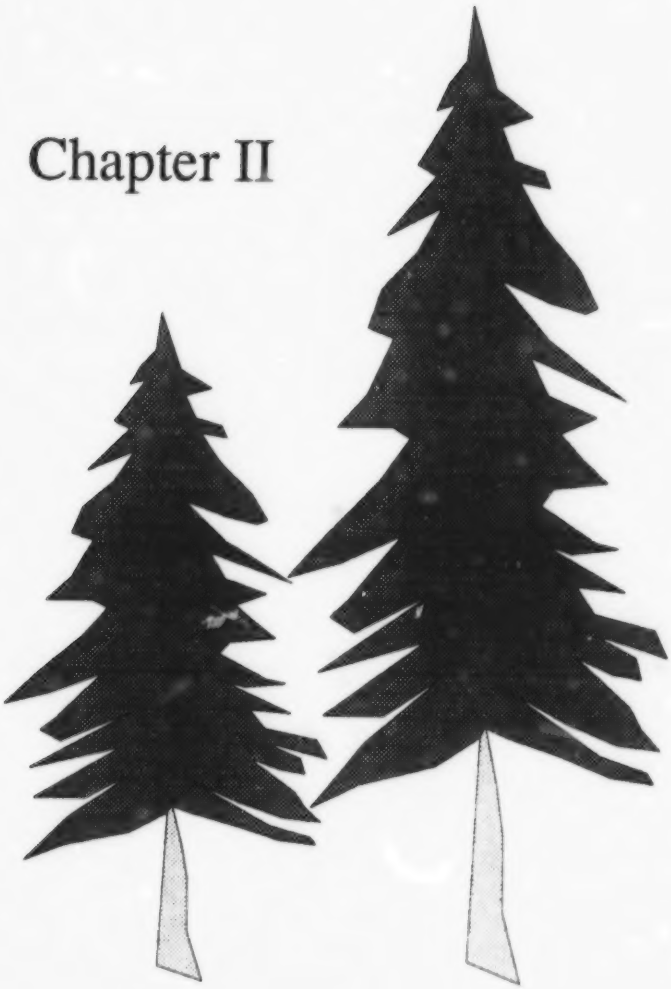
The survey examined workers' aspirations in three areas: employee outlook, silviculture training, and worker concerns.

Employee outlook: Workers were asked if they had adequate skills and experience to ensure future employment in silviculture. Two assumptions were made: First, that silviculture employment opportunities (labor demand) will exist in the future, and second, innovation in silvicultural technology is non-existent. Workers were to indicate their ability to secure future jobs and assess their human resource worth based on their future employment potential with current conditions.

Silviculture training: To assess the demand for silviculture education/training, workers were asked if they desired additional education or training. No mention was made about who would provide or bear the cost.

Worker concerns: Silviculture workers were asked their concerns about being employed in a particular silviculture employment category. Possible answers ranged from remoteness to working conditions. Assessments of areas that may need attention can be used to raise the attractiveness of the industry or avert major labor problems.

Chapter II



Forest Renewal Employment

Forest renewal workers are those publicly or privately employed individuals 15 years or over who receive pay or profit from providing services in forest renewal. Forest renewal is the process of establishing a tree crop on forest land or other lands suitable for the production of forest crops through artificial reforestation such as sowing of seed or planting, and natural regeneration such as modified harvest practices. In this survey, the data pertains exclusively to the forest renewal occupations of planting container and bare-root seedlings and cuttings.

Approximately 334 forest renewal workers were employed during the 1989 spring planting season in eastern Ontario. Seventy-nine percent were employed by private silviculture operators and 21% by public silviculture operators, for example, the Ontario Ministry of Natural Resources.

The following analysis provides a detailed socio-economic profile for the 319 forest renewal workers who responded to the survey. The analysis regards forest renewal workers as a homogeneous body and does not differentiate by public or private labor crew, private or Crown land, or forest management program.

Sex, age, and marital status

The forest renewal employment category is divided 80% male and 20% female (fig. 1).

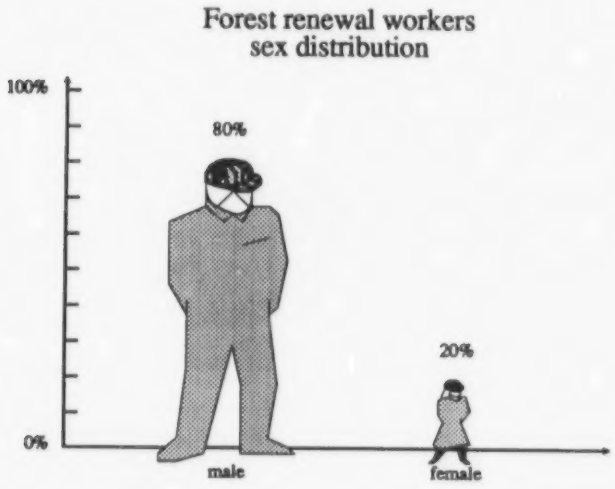
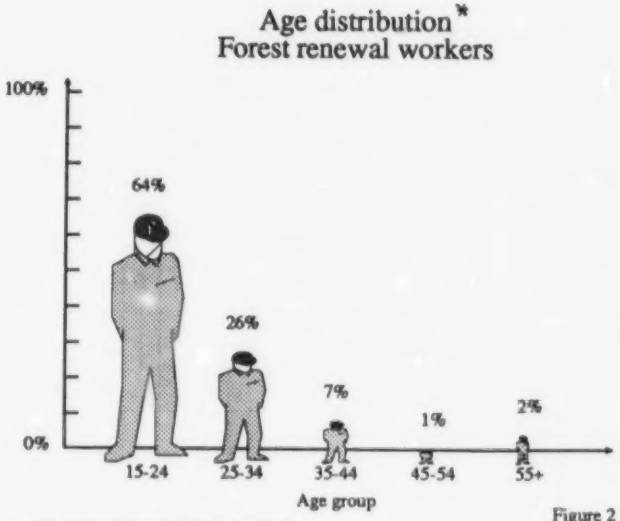


Figure 1

Workers are predominantly young with 90% falling between ages 15 and 34 (fig. 2). In this age group, the percentage of male and female workers are relatively the same (male: 89% and female: 93%). In the 45+ age group, forest renewal workers are only male.



*includes male and female workers

Figure 2

Most forest renewal workers (80%) are single (never married) while 16% are married. The majority of the married forest renewal workers fall within the 25-34 age group. Single forest renewal workers are mostly between 15 and 24 years.

Dependants

Eighty-one percent of all forest renewal workers have no children to support. Those without any children mostly are between 15 and 24 years. Moreover, the workers who do support children are mainly between 25 and 34. Of those with children, 93% support from one to three and 7% support four or more.

Approximately 12% of all forest renewal workers are married parents and 7% are single parents. Of the single parents, 29% are female and 71% are male. This reflects the male dominance of this employment group.

Formal and forestry education

Fifty-five percent of the forest renewal workers completed at least high school and 38% completed some form of post secondary education. Differentiated by sex, there is a small difference in the worker's attainment of formal education. For example, 54% of the male workers completed at least high school compared to 60% of the female workers.

When asked whether their formal education included forestry courses, only 10% indicated they had received some education in forestry (fig.3). Of those forest renewal workers who said they received some education in forestry, 47% reported an education in forestry general, which implies university courses in forestry, followed by forestry technology, implying those with a college education in forestry, 25%. The other forestry category consisting of forest recreation and forest resource management planning represented a noticeable contribution of 25%. Only 3% reported an education in forest engineering.

Forest renewal workers

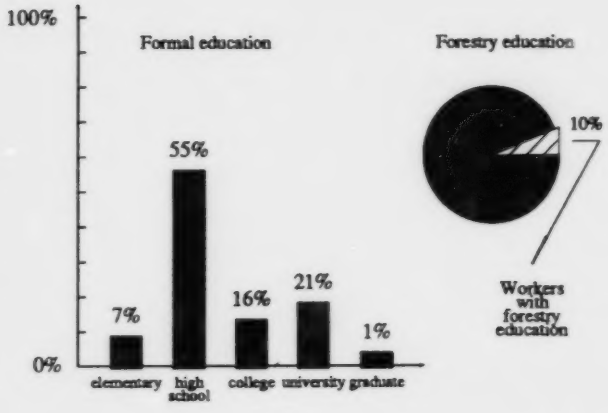
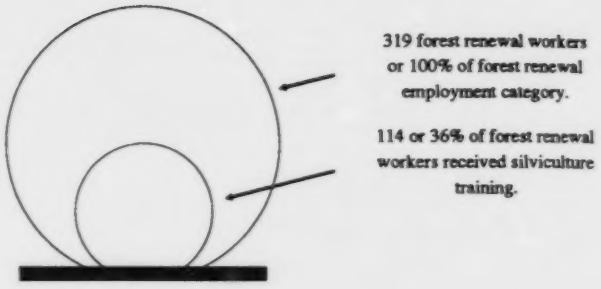


Figure 3

Forest renewal training

The forest renewal workers were asked whether they had received any silviculture training after leaving school; only 36% or 114 workers indicated they had. This implies a greater emphasis on silviculture training than forestry education as the major form of human resource investment. However, *only 21% of all forest renewal workers surveyed in eastern Ontario received training in planting* (fig. 4). With contracts demanding more stringent quality control on planting sites, the need to have high-quality workers is acute to reduce seedling mortality and forest management costs. The training received varied: some workers have had intensive training while others have had extensive training. Training could include instruction in planting regulations, handling of seedling stock, worker safety, on-site planting procedures, and the use of planting equipment. Other areas included site preparation, and stand tending.

Proportion of forest renewal workers with tree planting training


319 forest renewal workers or 100% of forest renewal employment category.
114 or 36% of forest renewal workers received silviculture training.

Only 21% had tree planting training.

Figure 4

Most workers who received training in planting obtained it from company sources (63%). This reflects a larger proportion of forest renewal operations falling within the private sector, although most planting contracts are tendered by the province. The training offered by private silviculture operators varied from formal programs to the simplest forms of learning by doing, observing others, and being reprimanded for mistakes. Other sources where training was received include government (17%), at home 9%, and other (11%).

Forest renewal experience

The survey revealed that 45% of all forest renewal workers have no previous experience in artificial reforestation. These workers are new entrants into the forest renewal employment category, but not necessarily into the silviculture labor force. This high number of new workers could be explained by an increase in forest management activity which would increase labor demand and a high job turnover rate. High job turnover rates are not uncommon in forest renewal because workers view the work as monotonous, physically demanding, and subject to extreme weather conditions.

Forest renewal workers with four or more seasons of experience accounted for only 22% of the total population (fig. 5). This highlights the inability to retain an experienced pool of forest renewal workers.[1]

Forest renewal experience

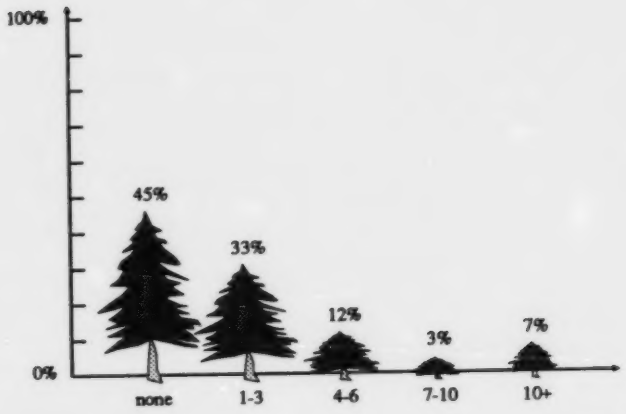


Figure 5

Table 6 compares forest renewal experience with experience in other silviculture fields. It is interesting to note that 41% of the new workers have no experience in any other silviculture activity. These new workers are absolutely new entrants. As the amount of experience increases, the proportion with experience in other silviculture fields also increases. This indicates that workers with additive exposure to forest renewal activities, for example, planting, tend to branch out into other silviculture fields and gain more experience.

Proportion of forest renewal workers with and without experience in other silviculture fields

Seasons of experience in forest renewal	Forest renewal workers	Proportion of workers with no experience in other silviculture fields	Proportion of workers with experience in other silviculture fields
	%	%	%
0	45	41	4
1 to 3	33	21	12
4 to 6	12	5	7
7 to 10	3	1	2
10 or more	7	2	5
Total	100	70	30

Table 6

[1] Silviculture employers indicated that worker retentions of fewer than four out of ten workers with four or more seasons of experience was a serious labor problem.

Human resource assessment

Table 7 compares all three forms of human resource investment. Only 2% of all forest renewal workers surveyed possess forestry education, silviculture training, and forest renewal experience. By contrast 36% of all forest renewal workers have no forestry education, silviculture training, or forest renewal experience. All other workers (62%) claimed other combinations of forestry education, training, or experience.

Overall human capital assessment
– Forest renewal worker –

Conditions	Workers	Total
no forestry education no silviculture training no forest renewal experience	116	36
no forestry education no silviculture training with forest renewal experience	111	35
no forestry education with silviculture training with forest renewal experience	38	12
with forestry education no silviculture training no forest renewal experience	4	1
with forestry education with silviculture training no forest renewal experience	0	0
with forestry education no silviculture training with forest renewal experience	23	7
no forestry education with silviculture training no forest renewal experience	22	7
with forestry education with silviculture training with forest renewal experience	5	2
Total	319	100%

Table 7

Residence

The survey revealed that 76% of all forest renewal workers lived in a community such as a village, town or city. Of this total, 39% were from a city such as Brockville. Workers who live in communities were mostly between 15 and 24 years. Those residing in the country were mostly between 25 and 34.

Considering residence, 22% are home owners, 44% rent their dwellings, and 34% fall into the neither category, those workers who are dependent upon others to bear accommodation cost (fig. 6).

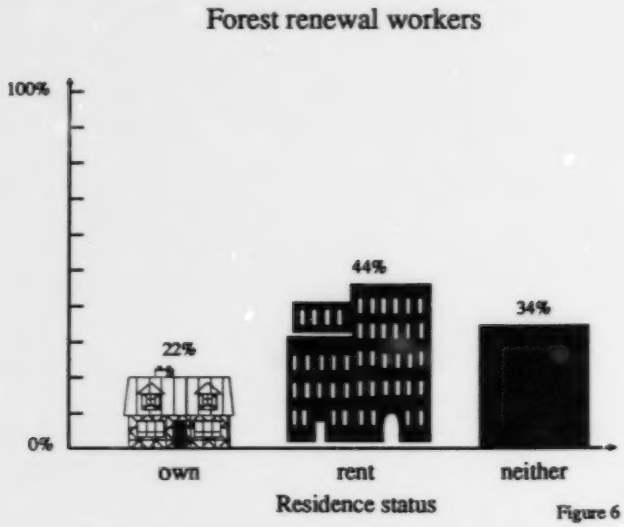


Figure 6

Gross income, silviculture income, and additional income

The majority of the forest renewal workers (65%) earned a gross income (all sources) in 1988 of less than $10,000. Only 2% received a gross income of $30,000 or more.

Approximately half, (53%) of the forest renewal workers stated that none of their 1988 gross income came from silviculture. Their income was totally dependent upon sources other than silviculture: 53% from non-forest sources, 40% from public sources, and the remaining 7% from farming and other forest-related work. Only 5% of all forest renewal workers derived all of their 1988 gross income from employment in silviculture. The remaining 42% derived between 25 and 75% of their gross income from silviculture employment and supplemented it with income from other sources; 48% from non-forest sources and 39% from public sources such as unemployment insurance, student loans, and welfare. The remaining 13% derived additional income from farming and other forest related work such as logging and paper and wood manufacturing (fig. 7).

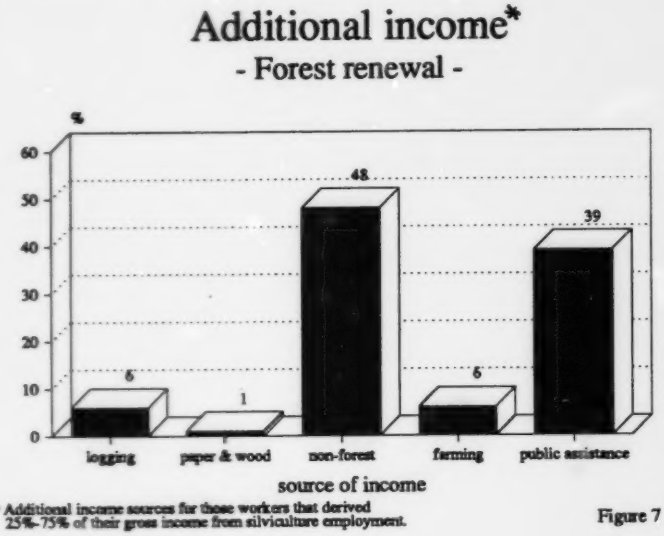


Figure 7

The difference between silviculture workers who did not secure any 1988 gross income from silviculture (53%) and the absolutely new entrants (41%) is 12%. These 12% are the relatively new forest renewal workers who abstained from silviculture employment in 1988, but returned to it in 1989.

The majority of forest renewal workers (65%) reported gross incomes (all sources) below the 1988 poverty line of $9,529 for urban areas of fewer than 30,000 inhabitants. The poverty line is based on a family unit of one individual. The number of weeks employed, the type of employment, or whether full or part time, is not relevant to the calculation. This urban size was chosen because 76% of the forest renewal workers were from communities such as Brockville.

Many forest renewal workers surveyed in 1989 reported incomes below the poverty line in 1988 that were earned from areas other than silviculture. Although, studying individuals with pay beneath the poverty line is important, worker incomes residing below this point and secured from some or all silviculture employment are of particular interest.

Therefore, separating forest renewal workers (65%) with incomes below the poverty line into two groups, 59% or 123 workers reported having incomes below the poverty line not generated from silviculture in 1988. The other group, 31% or 87 workers, reported living below the poverty line with incomes secured from some or all silviculture employment.

The number of forest renewal workers earning some or all of their income from silviculture and who appear to fall below the poverty line may be somewhat

inflated because many are students, perhaps skewing the results. Given that most student incomes in Canada fall below the poverty line, student forest renewal workers should be treated separately and extracted from the pool of forest renewal workers.

In forest renewal, one may contend there is no difference between a student or non-student forest renewal worker because both are generally employed for the same period of time. In addition, there is no evidence that the income earned in forest renewal is different between student or non-student forest renewal workers.

A rationale for separating student workers from the regular work force when considering income levels is that students tend to return to school, thus leaving the work force, while non-students search for other forms of employment. Those workers who remain in the general labor force and derive a gross income below the poverty line are the real concern. Given this concern it is important to separate the student forest renewal workers earning some or all income in silviculture and recalculate the number of workers who would fall below the poverty line.

However, the labor force survey did not collect information on whether the forest renewal workers were students or non-students. The age category 15-24 and the levels of educational attainment, namely, elementary and high school were used to estimate the number of student forest renewal workers. The 15-24 age group was used because it is the most likely age of individuals attending school. The elementary and high school levels of educational attainment were chosen because individuals who completed elementary school have a high probability of attending high school and those who completed high school less a drop-out factor[2] have a high probability of attending other forms of post secondary education. Individuals who have completed college, university or graduate school are assumed to enter the work force upon graduation and therefore are not considered.

Therefore, 21 workers assumed to be students were removed from the population of 87 workers. The remaining 66 non-student forest renewal workers represent 21% of the forest renewal employment category earning some or all income from silviculture below the poverty line. Since some of these workers may be married, their combined incomes could raise their financial standing above the poverty line based on a family unit of two.

Wage types and frequency of pay

Piece rates are the most commonly used method of payment for forest renewal projects in eastern Ontario with 72% of all workers paid on this basis. These workers are paid according to the number of seedlings they plant. The basic premise underlying the piece wage is the insurance that seedlings will be planted and labor productivity will be maintained at an acceptable level. Productivity is especially important given the short time to complete forest renewal operations. It is vital to undertake and complete forest renewal work within time constraints defined by biology and climate. Crew chiefs, supervisors, and permanent employees who manage the planting crews on the job site (28%) are primarily paid on an hourly or salary basis.

Workers are paid at differing times: 42% upon job completion and 56% on a weekly or bi-weekly basis. Only 2% are paid monthly. Pay-out formats are essentially at the discretion of the employer.

Work hours, days, and weeks

The length of a working day varies significantly. Fourteen percent work fewer than eight hours per day. Forty-two percent work eight hours a day and 44% report working greater than eight hours a day with hours ranging between 10 and 12 hours per day.

Weekly hours also vary significantly with 55% reporting more than forty hours per week. Some forest renewal workers are employed on a five day work week while others are employed on a six day work week. In addition, the work week is not defined as Monday to Friday or Saturday. Sunday planting is common. Weather conditions frequently determine the work week. Other factors may also impinge upon employable planting time: availability of seedlings from the nursery , the size and number of the planting operations, the tendering of planting contracts, and human factors.

In eastern Ontario, the planting window is approximately eight weeks between late April and late June. Within this time, variations of forest renewal employment are profound. Thirty-five percent of the forest renewal workers were reported to be employed less than 4 weeks, 60% between 4-12 weeks and 5% with 12+ weeks. Those who work more than twelve weeks are assumed to be involved in administration. Possible explanations for these variations in employment length are numerous such as the late arrival of seedlings from the nursery and the size of planting contracts. For example, small planting operations require fewer person-hours than large planting operations.

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[2] The percentage of secondary students who would go on to the post-secondary level is based upon 1987 data provided by the Ontario Ministry of Education. A dropout rate of 38% was used, assuming grade 12 as the graduating level.

Silviculture labor migration

The survey showed that 130 workers were absolutely new entrants into the silviculture labor force in 1989 (fig. 8). Thirteen workers claimed to be new entrants into the forest renewal category but had experience in other silviculture fields. Relatively new entrants accounted for 38 workers who did not join the silviculture labor force in 1988 and returned to work in 1989. There were 138 veteran workers who were employed in forest renewal during the 1988 forest management season and returned in 1989.

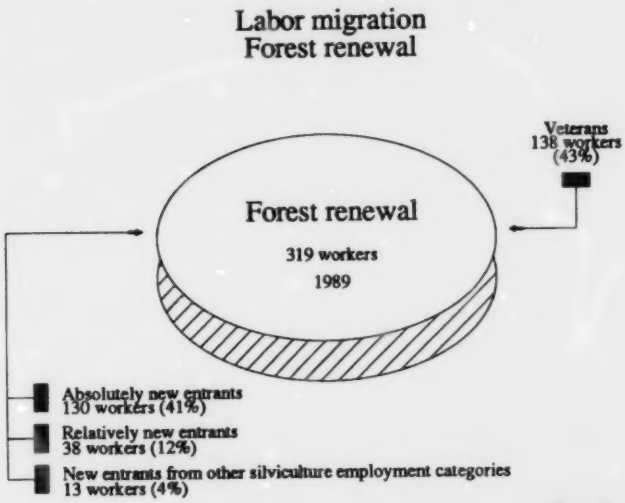


Figure 8

Employee aspirations

Male forest renewal workers felt slightly more confident than female workers about being able to secure future employment in silviculture given their present skill and experience. Those who were uncertain about future employment opportunities represented 25% of the female workers and approximately 20% of the male workers.

Dividing forest renewal workers into two age groups, 15-24 and 25+, approximately 70% age 25+ felt confident that they possessed adequate skills and experience to be assured of satisfactory employment in silviculture. By contrast, only 55% of those aged 15-24 felt similarly confident. This can be explained by the fact that a large proportion of workers were absolutely new entrants into the labor force and they mostly fell within the 15-24 age group. These new entrants would not have extensive forestry education, silviculture training, or experience.

Education or training demand

Those forest renewal workers wishing additional education or training in silviculture revealed that 68% were in favour of obtaining skills in all facets of silviculture (fig. 9). Only 20% requested additional training in forest renewal.

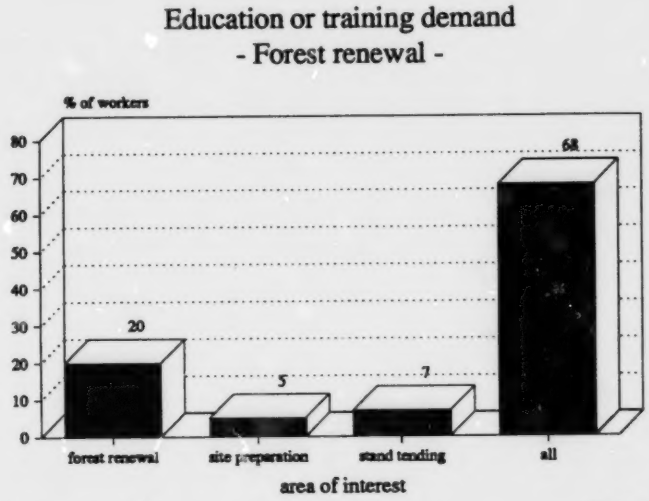


Figure 9

Worker concerns

In answering the subjective question, respondents addressed topics from working conditions to wages (fig. 10). These responses provided a general indicator of worker morale and problems that may need attention. The work environment ranked as the most significant concern of forest renewal workers. Approximately 40% complained of working in the rain, extreme temperatures, and having to contend with insect bites. The physical demands, seasonality, and monotonous nature of the work also contributed to negative attitudes towards tree planting.

Wages were not reported as a major issue nor did many complain about the hours of work. Remoteness did not play a significant role because many operations were located close to small towns and cities.

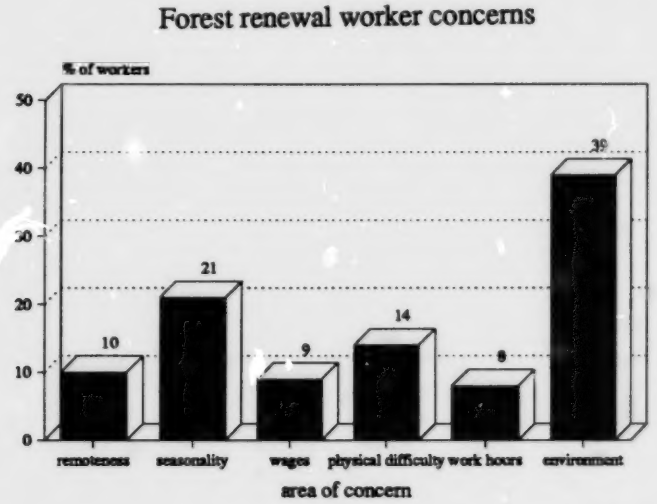
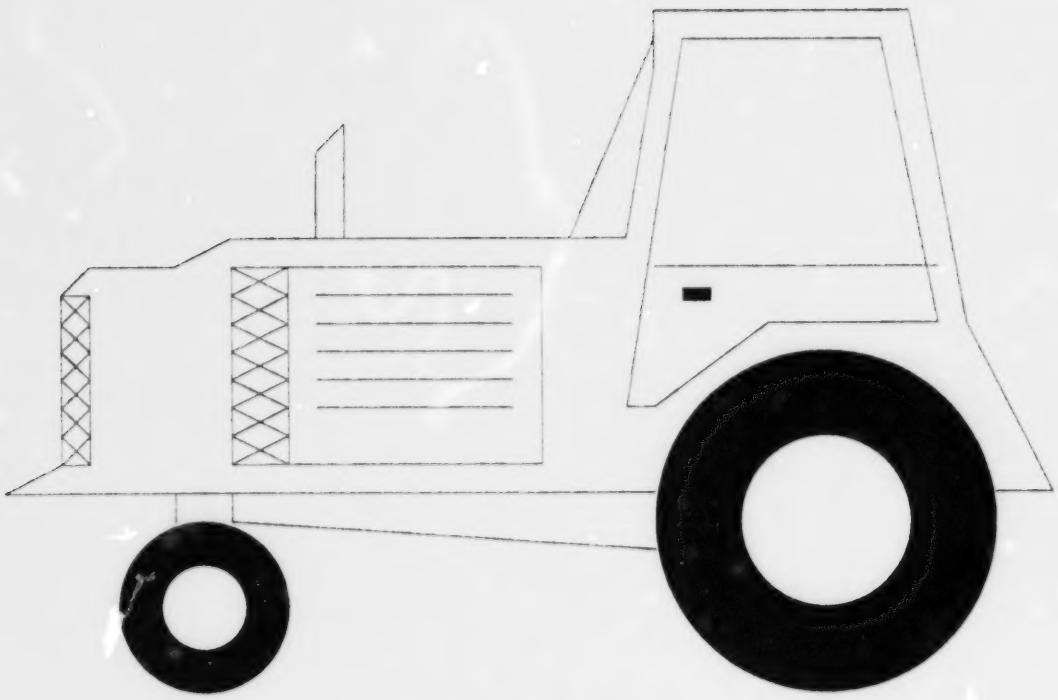


Figure 10

Chapter III



Site Preparation
Employment

Site preparation workers are those publicly or privately employed individuals 15 years or over who receive pay or profit from providing services in site preparation. Site preparation is the process of preparing the soil for a new crop of trees by disposal of woody debris and unharvested vegetation. The data pertains exclusively to the mechanical site preparation occupation.

Approximately 21 site preparation workers were employed during the 1989 season in eastern Ontario. Private operators employed about 58% of these workers and public operators, for example, Ontario Ministry of Natural Resources, employed 42%.

The following analysis details a socio-economic profile for the 21 site preparation workers who responded to the survey. The analysis regards the site preparation workers as a homogeneous body and does not differentiate by private or public crews, private or Crown land, or forest management program.

Sex, age, and marital status

In 1989, site preparation employment was 100% male (fig. 11) and 58% were between ages 15 and 34; 42% were 35 or over (fig. 12). Sixty-two percent of the site preparation workers were married and 38% single. The single workers were mostly between 15 and 24 years. Married workers were in all age groups except 15-24.

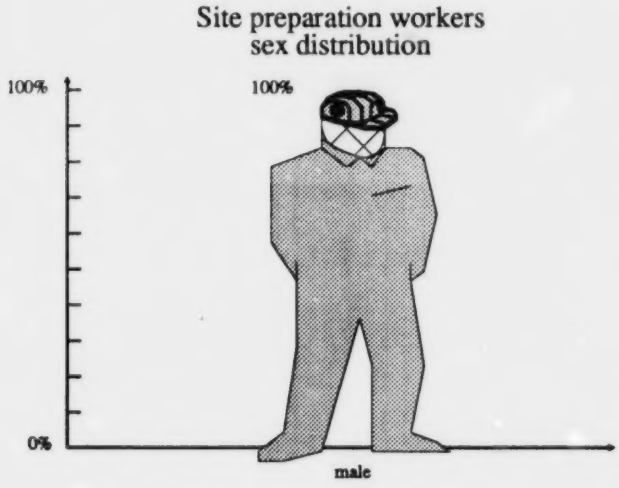


Figure 11

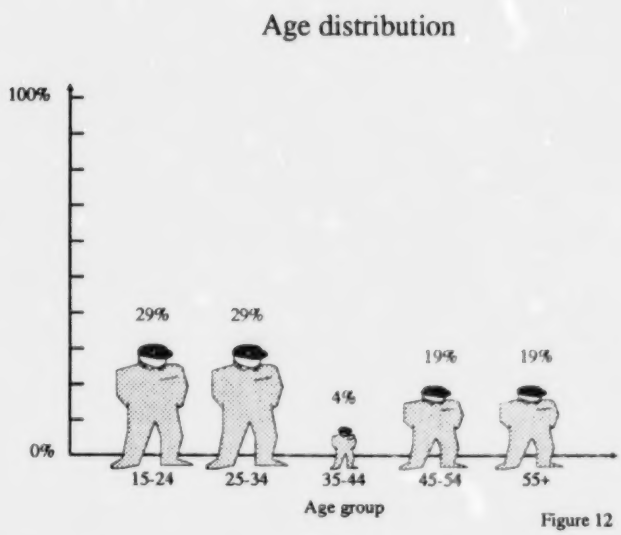


Figure 12

Dependants

Seventy-one percent of the site preparation workers reported no children to support. Of those with children, 83% supported from one to three children and only 17% support four or more. Those without any children mostly fall between 15 and 24 years and workers who do support children mostly fall between 25 and 34 years. All site preparation workers with children were married.

Formal and forestry education

Forty-three percent of the workers completed at least high school and 19% achieved some form of post secondary education. This employment category has a high percentage of workers with only an elementary education (38%) and they were concentrated within the 45+ age group.

Only 19% indicated they had received some education in forestry (fig. 13) and in every case it was in forest technology.

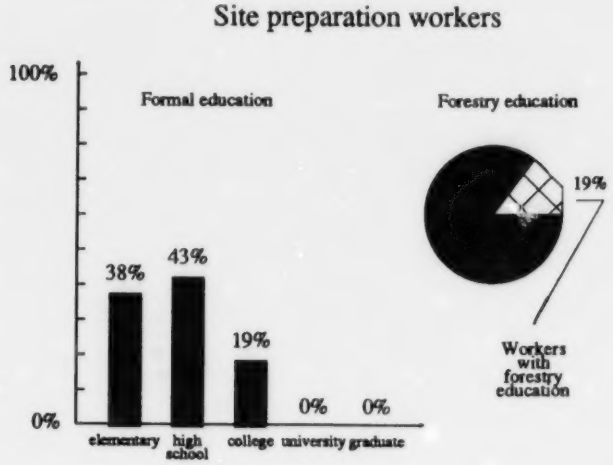
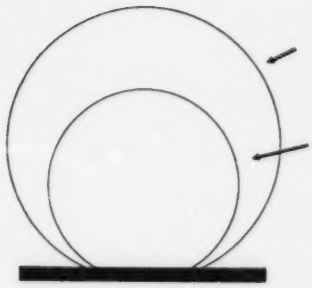


Figure 13

Site preparation training

The site preparation workers were asked whether they had received any silviculture training after leaving school; 62% or 13 workers indicated they had. This figure implies a greater emphasis on silviculture training than forestry education as the major form of human resource investment. However, *only 48% of all site preparation workers surveyed in eastern Ontario received training in site preparation (fig. 14).* Other areas of training included forest renewal and stand tending.

Proportion of site preparation workers with site preparation training



21 site preparation workers or 100% of the site preparation employment category.

13 or 62% of the site preparation workers received silviculture training.

Only 48% had site preparation training.

Figure 14

The majority of the workers who received training in site preparation obtained it from public sources (76%). This reflects the larger proportion of site preparation operations falling within the public sector. Other sources included company 8%, home 8%, and other 8%.

Site preparation experience

The survey revealed that all workers had at least one season of experience in preparing the soil for a new crop of trees. This lack of new workers may be an anomaly; however, some explanations exist. Many site preparation workers are self employed and usually provide their own heavy equipment. This equipment may include a tractor and bush-hog which are costly to acquire and maintain. In addition, experience handling heavy equipment on different terrains and the required knowledge of soil preparation techniques may deter potential workers. Many, 52%, have four or more seasons of experience in site preparation (fig. 15) which demonstrates a low job turnover rate and the ability to retain an experienced pool of site preparation workers.

Site preparation experience

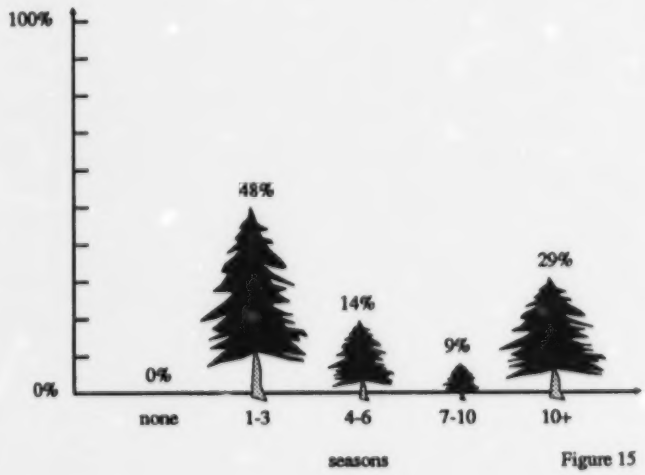


Figure 15

Table 8 compares the number of site preparation workers with experience in site preparation to those with experience in other silviculture fields. As experience in site preparation increases, the number of workers with experience in other silviculture fields also increases. This indicates that workers with additive exposure to site preparation tend to branch out in other silviculture fields.

Proportion of site preparation workers with and without experience in other silviculture fields			
Seasons of experience in site preparation	Site preparation workers	Proportion of workers with no experience in other silviculture fields	Proportion of workers with experience in other silviculture fields
	%	%	%
0	0	0	0
1 to 3	48	14	34
4 to 6	14	5	9
7 to 10	9	0	9
10 or more	29	0	29
Total	100	19	81

Table 8

Human resource assessment

Table 9 compares all three forms of human resource investment. *Only 14% of all site preparation workers possess forestry education, silviculture training, and experience.* All other workers (86%) reported other combinations of forestry education, training, and site preparation experience.

Overall human capital assessment
– Site preparation worker –

Conditions	Workers	Total
no forestry education no silviculture training no site preparation experience	0	0
no forestry education no silviculture training with site preparation experience	7	33
no forestry education with silviculture training with site preparation experience	10	48
with forestry education no silviculture training no site preparation experience	0	0
with forestry education with silviculture training no site preparation experience	0	0
with forestry education no silviculture training with site preparation experience	1	5
no forestry education with silviculture training no site preparation experience	0	0
with forestry education with silviculture training with site preparation experience	3	14
Total	21	100%

Table 9

Residence

The survey revealed that 14% of all site preparation workers lived in a community setting such as a village or town. The remaining 86% lived in the country, either on a farm or other rural setting. Site preparation workers residing in communities were mostly between 15 and 24 years. Those residing in the country ranged throughout all age categories.

Fifty-two percent of the site preparation workers were home owners and 10% rent their dwellings. Thirty-eight percent fall into neither category which can be interpreted as those who were dependant upon others for their accommodations (fig. 16).

Site preparation workers

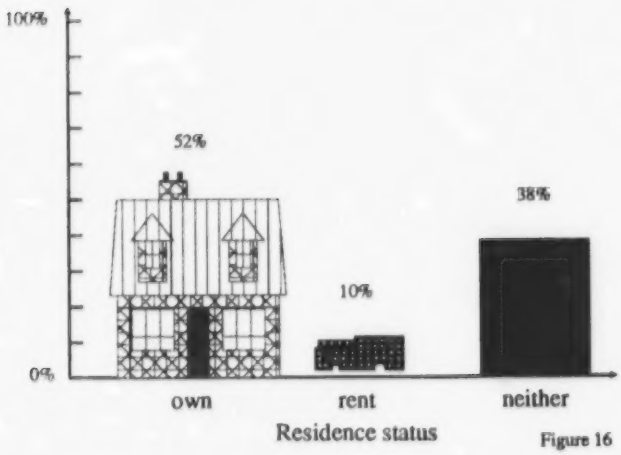


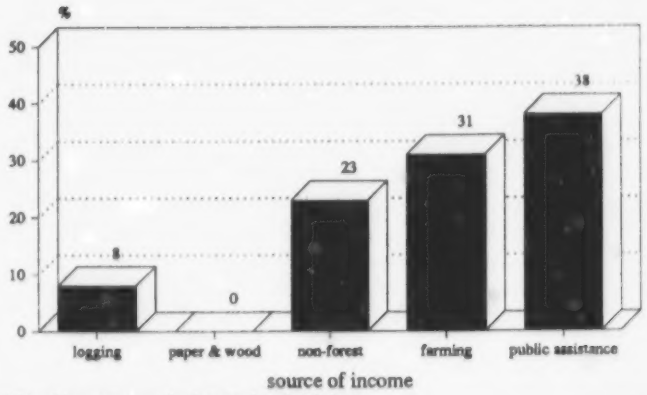
Figure 16

Gross income, silviculture income, and additional income

Twenty percent of all site preparation workers reported their gross income (all sources) in 1988 was less than $10,000. Only 4% of all site preparation workers received a gross income of $30,000 or more.

Only 5% stated that none of their 1988 gross income was attributed to working in silviculture. Non-forest employment was the only income source. Thirty-three percent of the workers derived all of their 1988 gross income from employment in silviculture. Sixty-two percent of the site preparation workers secured between 25 and 75% of their 1988 gross income from employment in silviculture. This indicates they derived additional income from other sources. Twenty-three percent reported additional income from non-forest sources, 31% from farming, and 38% from public sources such as unemployment insurance, welfare, etc. The remaining 8% derived additional income from logging. The fact that a sizable group derived additional income from farming shows that site preparation and farming are complementary occupations (fig. 17).

Additional income*
- Site preparation -



* Additional income sources for those workers that derived 25%-75% of their gross income from silviculture employment.

Figure 17

Since workers reported working at least one season in site preparation or other silviculture activities, no absolutely new entrants joined the 1989 labor force . The difference between those who secured no portion of their 1988 gross income from silviculture (5%) and the absolutely new entrants (0%) is 5%. These 5% are the relatively new entrants into site preparation employment. These relatively new entrants include site preparation workers surveyed in 1989 who abstained from silviculture employment in 1988, but returned to it in 1989.

Wage types and frequency of pay

Eighty-six percent of all site preparation workers are paid on a hourly basis. Weekly and bi-weekly pay outs appear to be the norm with 86% of all workers paid in this manner. Nine percent are paid upon termination of the job and only 5% are paid monthly.

Work hours, days and weeks

The length of a working day is split primarily into two groups. Forty-eight percent work eight hours a day and 33% report working greater than eight hours per day, ranging between 10 and 11 hours per day. The remaining site preparation employees worked fewer than eight hours per day.

The number of hours per week workers were employed in site preparation leans toward forty hours or more, 86%. There is no accepted work week within site preparation. Some are employed on a five day work week while others are employed on a six day

work week. In addition, working on week-ends is quite common. The maximum number of work weeks available for site preparation is controlled by the biology and climate. Many factors impinge upon employable site preparation time: availability of equipment, the size and number of operations, the tendering of contracts, weather and site conditions, and human factors.

In eastern Ontario, the window for site preparation is approximately twenty-four weeks from mid April to mid October. Extensions beyond mid October are possible depending upon the level of snowfall. There are many variations in the length of site preparation employment. Four percent of the workers reported they were employed less than 4 weeks, 38% between 4 and 8 weeks and 58% reported 8+ weeks. Explanations for these variations are numerous. For example, small site preparation operations require fewer person-hours than large operations. Whatever the cause, employment in site preparation remains highly seasonal.

Silviculture labor migration

The survey reported neither absolutely new entrants into the site preparation category in 1989 (fig. 18) nor new workers from other silviculture fields. One relatively new entrant abstained from forestry employment in 1988, but returned to work in 1989. Veteran site preparation workers accounted for 20 workers. They were employed in site preparation during the 1988 season and returned to work in 1989.

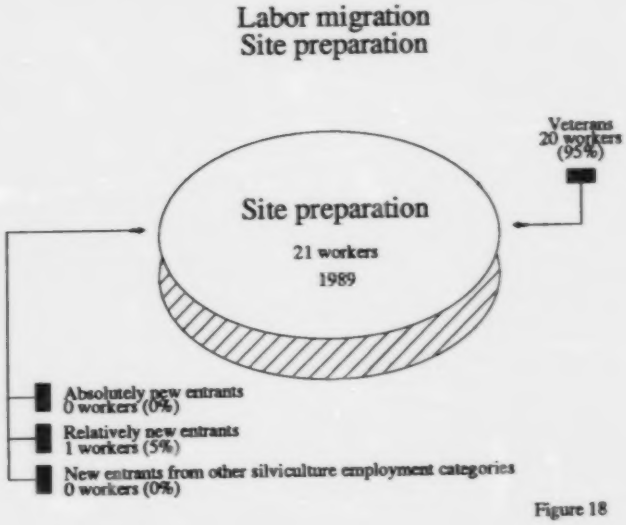


Figure 18

Employee aspirations

Overall, 86% of the site preparation workers felt confident about being able to secure future employment in silviculture given their present skill and experience. Only 14% were uncertain about future employment.

Education or training demand

The responses were split with 57% desiring additional education or training and 43% indicating no desire. Of those wishing additional education or training, 50% mentioned skills in site preparation and the other half wanted training in other areas such as forest renewal and stand tending (fig. 19).

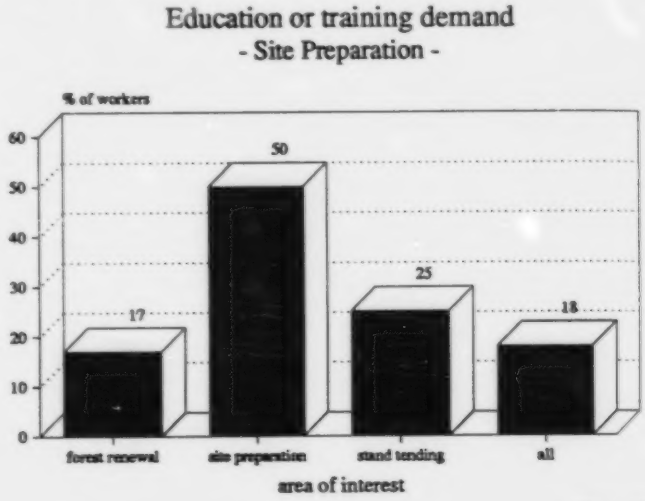


Figure 19

Worker concerns

In answering the subjective question, respondents addressed topics from working conditions to wages (fig. 20).

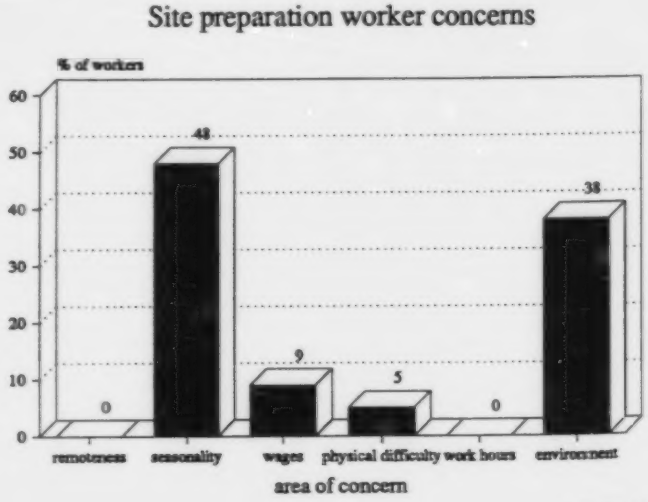


Figure 20

These responses provided a general indicator of worker morale and problems that may need attention. The seasonal nature of the job and work environment were of greatest concern. Forty-eight percent disapproved of the short season and 43% complained of working in the rain, extreme temperatures, and having to contend with insect bites.

Wages were not a major issue nor did many complain about the hours of work. Remoteness did not play a significant role because site preparation operations occur in a rural setting where 86% of all site preparation workers reside.

Chapter IV

Stand Tending Employment

Stand tending workers are those publicly or privately employed individuals 15 years or over who receive pay or profit from providing services in stand tending. Stand tending requires caring for an established timber stand at any stage of its life for the benefit of the forest crop. The data pertains to the stand tending occupations of chemical, mechanical, hand or manual cleaning, brushing and pre-commercial thinning.

Approximately 67 stand tending workers were employed during 1989 in eastern Ontario. Private operators employed approximately 46% of these workers and public operators employed 54%.

The following analysis details a socio-economic profile for the 63 stand tending workers who responded to the survey. The analysis regards the stand tending workers as a homogeneous body and does not differentiate by private or public crews, private or Crown land, or forest management program.

Sex, age, and marital status

In 1989, stand tending employment was 98% male and 2% female (fig. 21).

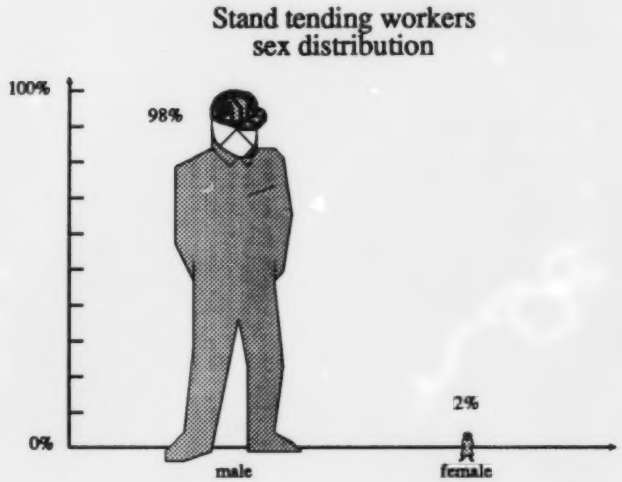


Figure 21

Seventy percent were between 15 and 34 years (fig. 22). By gender, 69% of the male workers fell within the 15-34 age group. All female stand tending workers were between 25 and 34.

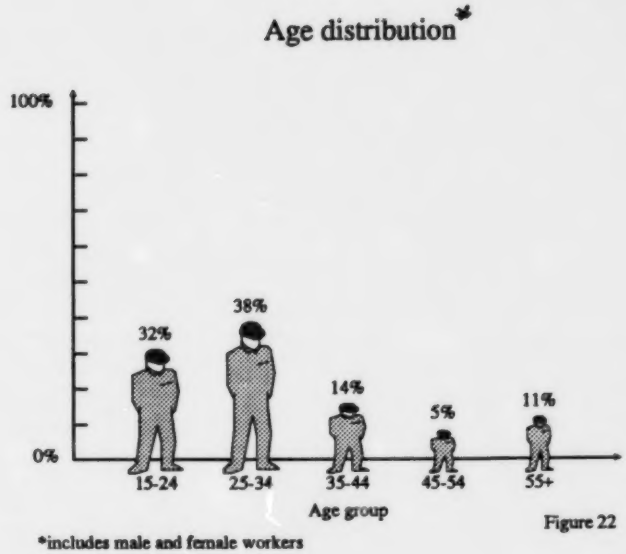


Figure 22

Forty-nine percent of all workers were single (never married) and 46% were married. Most single workers were between 15 and 24 years. Married workers appeared in all age categories except the 15-24 age group.

Dependants

Fifty-nine percent of the stand tending workers had no children to support and 41% had children. Of those with children, 92% support from one to three and only 8% claimed four or more. Those without any children mostly fell between 15 and 24 years and workers who did support children mostly fell between 25 and 34 years. Approximately, 8% of all stand tending workers were single parents and 35% were married parents.

Formal and forestry education

Fifty-six percent of the workers completed at least high school and 27% completed some form of post secondary education. This employment category has a low percentage of workers with only an elementary education (17%) and they are concentrated within the 45+ age group.

Only 25% indicated they had received some education in forestry (fig. 23). Of those, 50% reported an education in forestry general, followed by forestry technology 38%, forestry engineering, 10%, and 12% reported other forestry education such as Christmas tree and sugar bush management.

Stand tending workers

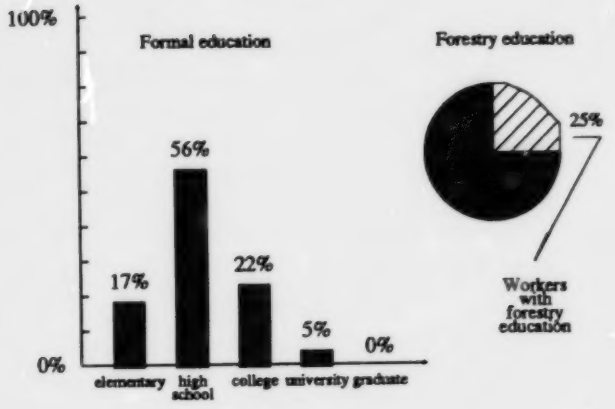


Figure 23

Most who received training in stand tending obtained it from the province (66%), usually provided on request by certified instructors. This reflects the large proportion of training programs in stand tending offered within the public domain. Additional sources where training was received included company, 29%, and home, 5%. Generally training is offered through formal programs.

Stand tending experience

The survey revealed that 16% of all stand tending workers have no previous experience in stand tending. This low number of new entrants could be explained by a possible decrease in this type of forest management activity resulting in a low demand or merely a low job turn over rate. Stand tending workers with four or more seasons of experience account for 43% of the total population (fig. 25) which demonstrates an ability to retain an experienced pool of stand tending workers.

Stand tending experience

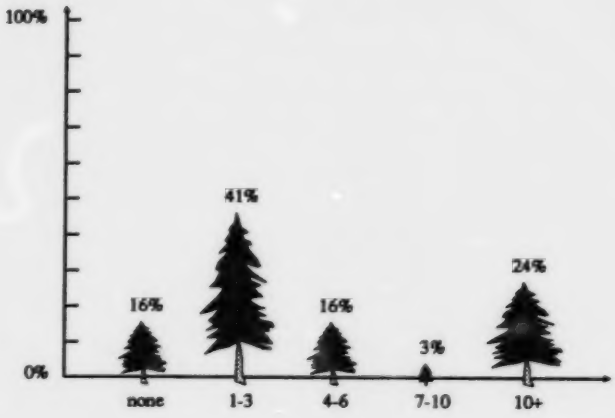
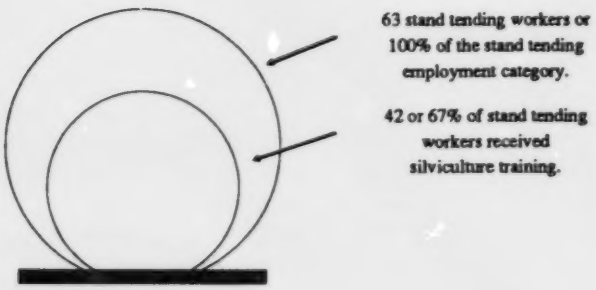


Figure 25

Stand tending training

The stand tending workers were asked whether they had received any silviculture training after leaving school; 67% or 42 workers indicated they had. This figure implies a greater emphasis on silviculture training than forestry education as the major form of human resource investment. However, *only 48% of all stand tending workers surveyed in the eastern Ontario received training in stand tending (fig. 24).*

Proportion of stand tending workers with stand tending training


63 stand tending workers or 100% of the stand tending employment category.
42 or 67% of stand tending workers received silviculture training.

Only 48% had stand tending training.

Figure 24

Training can include instruction on safety techniques, equipment use and maintenance, proper dress, and stand tending practices. Other areas where training was received included forest renewal and site preparation.

Table 10 compares the number of stand tending workers with experience in stand tending to those with experience in other silviculture fields. Eight percent of all workers were absolutely new entrants into the silviculture labor force.

Proportion of stand tending workers with and without experience in other silviculture fields			
Seasons of experience in stand tending	Stand tending workers	Proportion of workers with no experience in other silviculture fields	Proportion of workers with experience in other silviculture fields
	%	%	%
0	16	8	8
1 to 3	41	19	22
4 to 6	16	2	14
7 to 10	3	1.5	1.5
10 or more	24	0	24
Total	100	30.5	69.5

Table 10

Human resource assessment

Table 11 compares all three forms of human resource investment. Only 22% of the workers surveyed had some forestry education, silviculture training, and stand tending experience compared to 9% who had no forestry education, silviculture training, or stand tending experience. All others (69%) had some combination of forestry education, silviculture training and experience.

Overall human capital assessment
– Stand tending workers –

Conditions	Workers	Total
no forestry education no silviculture training no stand tending experience	6	9
no forestry education no silviculture training with stand tending experience	16	25
no forestry education with silviculture training with stand tending experience	22	35
with forestry education no silviculture training no stand tending experience	0	0
with forestry education with silviculture training no stand tending experience	1	2
with forestry education no silviculture training with stand tending experience	1	2
no forestry education with silviculture training no stand tending experience	3	5
with forestry education with silviculture training with stand tending experience	14	22
Total	63	100%

Table 11

Residence

The survey revealed that 58% of all stand tending workers live in a village, town, or city. The remaining 42% reside in the country. Stand tending workers living in a community are mostly between 15 and 34. Also, those residing in the country are mostly between 15 and 34. Forty-four percent of the stand tending workers are homeowners; 35% rent their dwellings, and 21% claimed neither which can be interpreted as those who were dependant upon others for their accommodations (fig. 26).

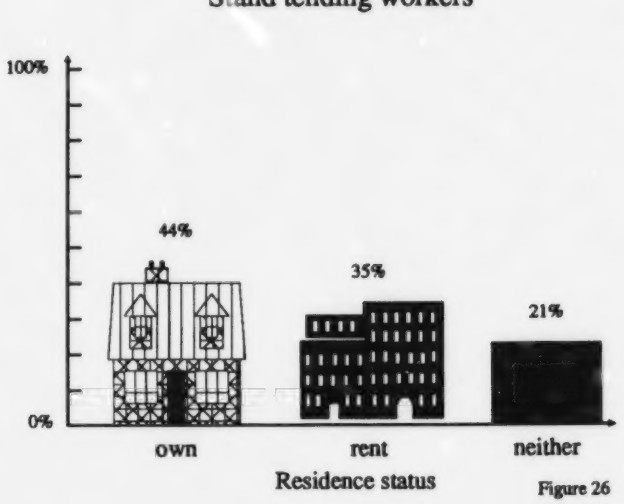


Figure 26

Gross income, silviculture and additional income

Twenty-four percent of all stand tending workers reported their gross income in 1988 was less than $10,000. Only 8% of all stand tending workers received a gross income of $30,000 or more.

Only 33% stated that none of their 1988 gross income was attributed to employment in silviculture. Their income was totally dependant upon sources other than silviculture; 76% from non-forest employment, 14% from farming, and 10% from public sources. Six percent of the stand tending workers derived all of their 1988 gross income from employment in silviculture.

Sixty-one percent of the stand tending workers secured between 25 and 75% of their 1988 gross income from employment in silviculture. This indicates they derived additional income from other sources. Fifty-three percent declared additional income from non-forest sources, 34% from public sources such as unemployment insurance, welfare, and 8% from logging. The remaining 5% derived additional income from farming (fig. 27).

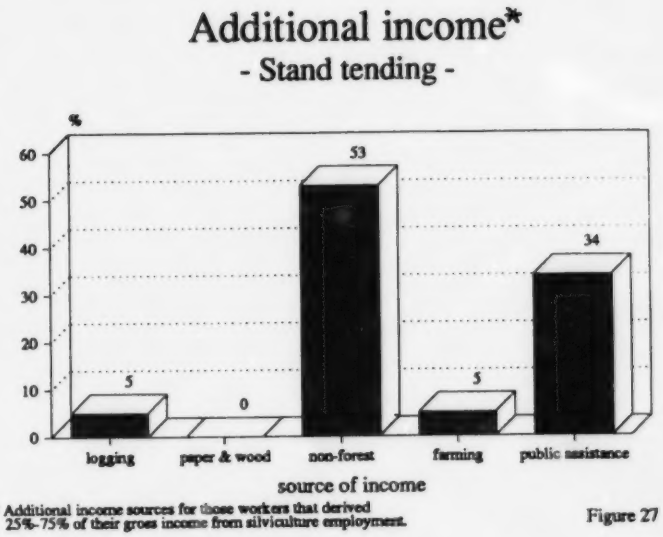


Figure 27

Since 16% of all stand tending workers were absolutely new silviculture laborers, the difference between those who secured no portion of their 1988 gross income from silviculture (33%) and the absolutely new entrants (16%) is 17%. This 17% represents the relatively new entrants into stand tending. They include stand tending workers who abstained from silviculture employment in 1988, but returned to it in 1989.

Wage types and frequency of pay

Sixty-seven percent of all stand tending workers are paid on a hourly basis. Only 11% are paid on a piece basis. The remaining 22% are mainly salaried and they are primarily crew chiefs, supervisors, and company employees who manage the tending crews on the job site. Bi-weekly and weekly pay-outs appear to be the norm with 95% of all stand tending workers paid in this manner. Two percent are paid upon termination of the job and only 3% are paid monthly.

Work hours, days, and weeks

Most stand tending workers (75%) work an eight hour day. Some (25%) reported a work day longer than eight hours. Those who reported a work day greater than eight hours reported a range from 9 to 10 hours. The remainder worked less than eight hours per day.

Most also worked (73%) a forty hour week. A work week defined as Monday to Friday appears to be the accepted norm for stand tending, although some reported a six-day work week.

The maximum number of weeks for stand tending is controlled by biology and climate. Many factors impinge upon employable stand tending time:

availability of equipment, the size and number of operations, the tendering of contracts, weather and site conditions, and human factors.

In eastern Ontario, stand tending operations happen at various times throughout the year. For example, chemical and mechanical stand tending are conducted between mid-April and mid-September while pruning is done between July and April. The majority of stand tending workers (54%) were employed more than twelve weeks, 6% for less than 4 weeks, and 40% between 4 and 12 weeks. Explanations for these variations are numerous. For example, small stand operations require fewer person-hours than large operations, certain stands have a high stem density requiring heavy thinning, and some forests require special attention. Whatever the cause, employment opportunities are generally longer than in other forms of silvicultural employment.

Silviculture labor migration

The survey reported that five workers were absolutely new entrants into labor force in 1989 (fig. 28). Five more were new to stand tending but had experience in other silviculture fields. Relatively new entrants accounted for 16 workers. They abstained from employment in the forestry labor force in 1988, but returned to work in 1989. Thirty-seven workers were employed in stand tending during the 1988 forest management season and returned to work in 1989.

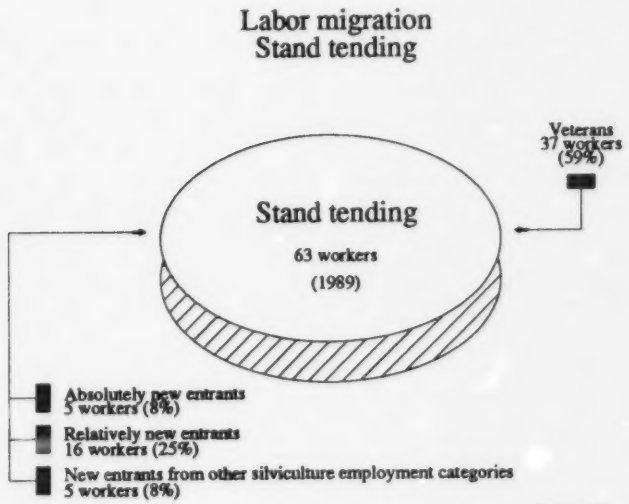


Figure 28

Employee aspirations

Overall, 75% of the stand tending workers felt confident about being able to secure future employment in silviculture given their present skill and experience. Only 17% were uncertain about future employment. This is not surprising since so many had experience in stand tending. These veterans possess a large accumulation of human resource assets in silviculture such as forestry education, silviculture training, and experience.

Education or training demand

Respondents strongly favoured (68%) additional education or training in silviculture. Only 32% indicated no desire for additional training. Of those wishing additional education, 44% specifically mentioned stand tending; the remaining 56% indicated areas such as forest renewal and site preparation (fig. 29).

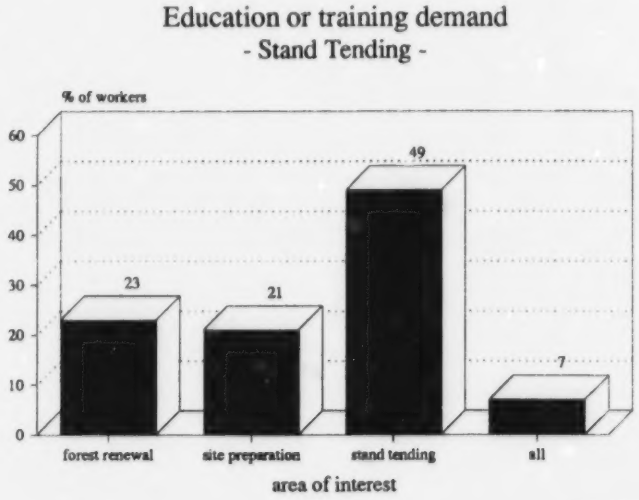


Figure 29

Worker concerns

In answering the subjective question, respondents addressed topics from working conditions to wages (fig. 30). These responses provided a general indicator of worker morale and problems that may need attention.

The seasonal nature of the job and work environment were the areas of greatest concern. Concern about the seasonal nature of the work is interesting because 54% were employed more than 12 weeks and stand tending employment is less seasonal than other forms of silvicultural employment. Nonetheless, 36% disapproved of the short work season and 46% complained of working in the rain, extreme temperatures, and contending with insect bites.

Wages were not a major issue nor did many complain about the hours of work. Remoteness did not play a significant role because many operations were located close to small towns and cities.

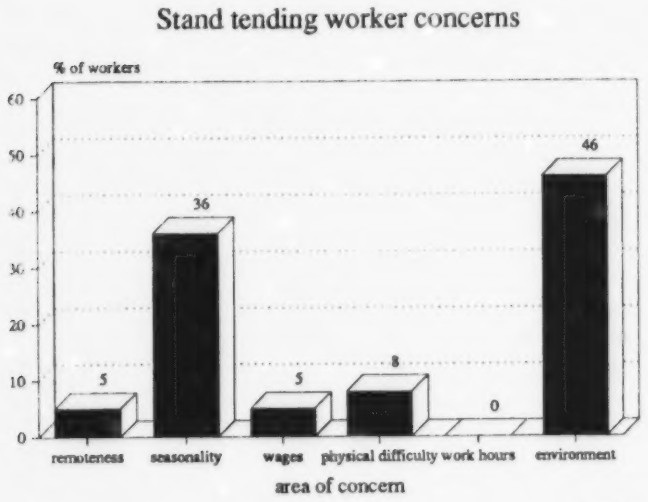
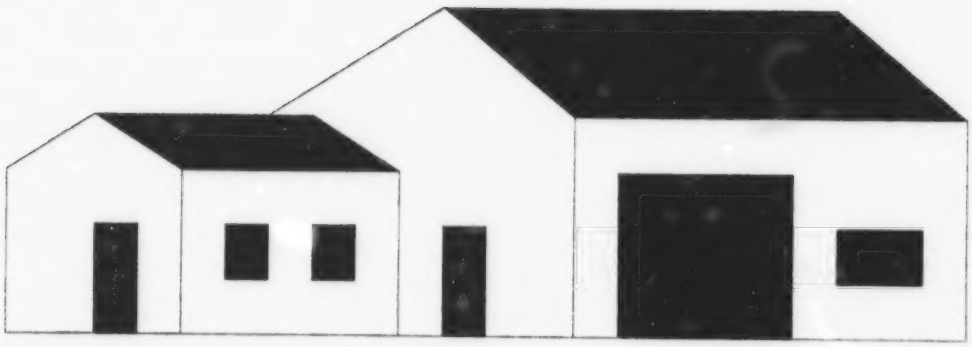


Figure 30

Chapter V



Nursery
Employment

Nursery workers are those publicly or privately employed individuals 15 years or over who receive pay or profit from providing silvicultural services in a nursery. Nursery workers produce seedlings, and seed, for new forest crops. The analysis pertains to the occupations of seedling lifting, or uprooting seedlings to transplant into a forest renewal site, and in the processing of hybrid poplar stems. Approximately 136 workers were employed during the 1989 season. Approximately 86% were employed by private silviculture operators and 14% were employed by public silviculture operators such as the Ontario Ministry of Natural Resources.

The following analysis details a socio-economic profile for the 127 nursery workers who responded to the survey. The analysis regards the nursery workers as a homogeneous body and does not differentiate by private or public crews, private or Crown land, or forest management program.

Sex, age, and marital status

In 1989, nursery employment was 58% female and 42% male (fig. 31).

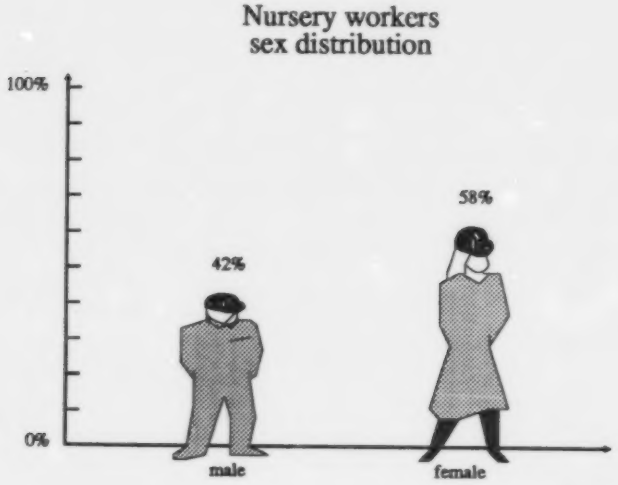


Figure 31

Fifty-six percent of all workers were between 25 and 44 years, reflecting a middle-aged work force (fig. 32).

*includes male and female workers

Figure 32

The percentage of male and female workers differed slightly between the 25 to 44 age group (male, 53%; female, 58%) and were virtually the same within the 45+ age group (male: 12% and female: 15%).

Forty-four percent were single (never married) while 48% were married. However, 66% of the males were single compared to 28% of the females. Most married nursery workers fall between 25-44 years and single workers were mostly between 15 and 24 years.

Dependants

Fifty-one percent of the nursery workers did not have any children to support. Of those with children, 94% supported from one to three children and only 6% supported four or more. Those without any children were mostly between 15 and 24 years. Moreover, the nursery workers who did support children were between 25 and 44 years. Only 9% of all nursery workers were single parents and 39% were married parents.

Formal and forestry education

Fifty-two percent of all nursery workers completed at least high school and 30% completed some form of post secondary education. Women and men differ slightly: 57% of the men completed at least high school compared to 49% of the women.

Only 13% indicated some education in forestry (fig. 33). Of those, 56% reported an education in forestry general, followed by forestry technology 25%, forestry engineering 6% and 13% other forestry education.

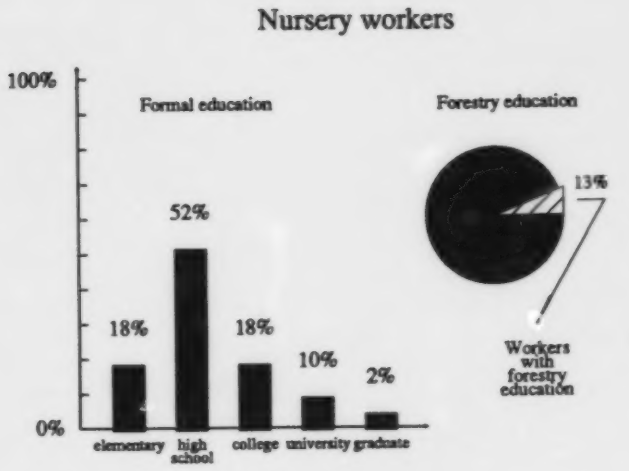


Figure 33

Nursery training

The nursery workers were asked whether they had received any nursery training after leaving school; 32% or 41 workers indicated they had. This figure implies a greater emphasis on nursery training than forestry education as the major form of human resource investment. However, *only 18% of all nursery workers surveyed in eastern Ontario received training in seedling lifting (fig. 34).* Training for nursery workers can include instruction in proper dress to protect against inclement weather, injury from dirt and trees, insect bites and stings, and injuries associated with repetitive movements. In addition, instruction is available in lifting procedures, quality control, pruning and packing. Some nursery workers indicated, in addition to seedling lifting training, they received training in planting and site preparation.

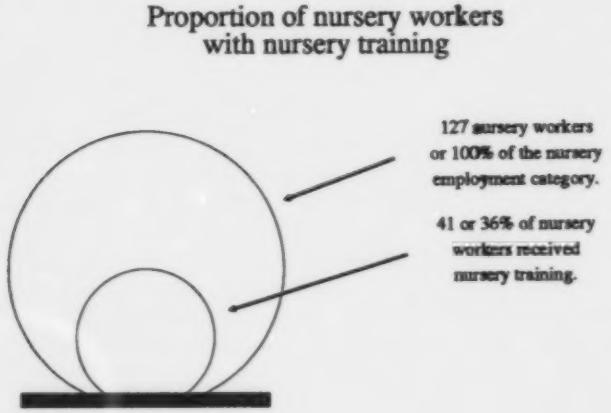

Proportion of nursery workers with nursery training
127 nursery workers or 100% of the nursery employment category.
41 or 36% of nursery workers received nursery training.
Only 18% had training in seedling lifting.

Figure 34

Most who received nursery training obtained it from public sources (46%). This reflects the public ownership and management of the Kemptville nursery.

Additional sources where training was received include company, 37%, at home, 5%, and other, 12%. Training varied from formal programs to the simplest demonstration.

Nursery experience

The survey revealed that 42% of all nursery workers have no previous experience in seedling lifting (fig. 35). This high number of new entrants could be explained by a possible increase in the demand for nursery stock or a high job turnover rate because seedling lifting is very labor intensive requiring a high degree of manual dexterity and patience for repetitive movements. The work is physically demanding and subject to changing weather conditions. Nursery workers with four or more seasons of experience amounted to 32% of the total population which shows the ability to retain some experienced nursery workers.

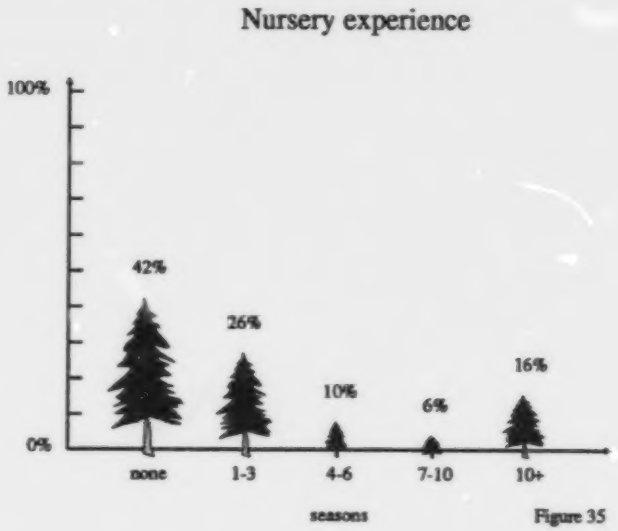


Figure 35

Table 12 compares the number of nursery workers with seasons of experience in nursery work and those with experience in other silviculture fields. The 36% with no experience in any silviculture work were absolutely new entrants into the silviculture labor force. As the amount of experience working in a nursery increases, the proportion of nursery workers with experience in other silviculture fields also increases. This indicates that workers with additive exposure to nursery work tend to branch out into other silviculture fields.

Proportion of nursery workers with and without experience in other silviculture fields			
Seasons of experience in nursery	Nursery workers	Proportion of workers with no experience in other silviculture fields	Proportion of workers with experience in other silviculture fields
	%	%	%
0	42	36	6
1 to 3	26	19	7
4 to 6	10	3	7
7 to 10	6	2	4
10 or more	16	3	13
Total	100	63	37

Table 12

Human resource assessment

Table 13 compares all three forms of human resource investment. Only 6% of all nursery workers surveyed in eastern Ontario had some forestry education, nursery training, and nursery experience compared to 33% who had no forestry education, nursery training, and experience. All others (61%) had some combination of forestry education, nursery training and nursery experience.

Overall human capital assessment
– Nursery workers –

Conditions	Workers	Total
no forestry education no silviculture training no nursery experience	42	33
no forestry education no silviculture training with nursery experience	37	29
no forestry education with silviculture training with nursery experience	25	20
with forestry education no silviculture training no nursery experience	3	2
with forestry education with silviculture training no nursery experience	1	1
with forestry education no silviculture training with nursery experience	4	3
no forestry education with silviculture training no nursery experience	7	6
with forestry education with silviculture training with nursery experience	8	6
Total	127	100%

Table 13

Residence

The survey revealed that 46% of all nursery workers were from a village or town such as Kemptville. Only 9% were from a city and 45% were from the surrounding countryside,either a farm or a rural dwelling.

One-half of the nursery workers were home owners; 25% rented their dwellings; and 25% claimed neither which can be interpreted as those who were dependant upon others for their accommodations (fig. 36).

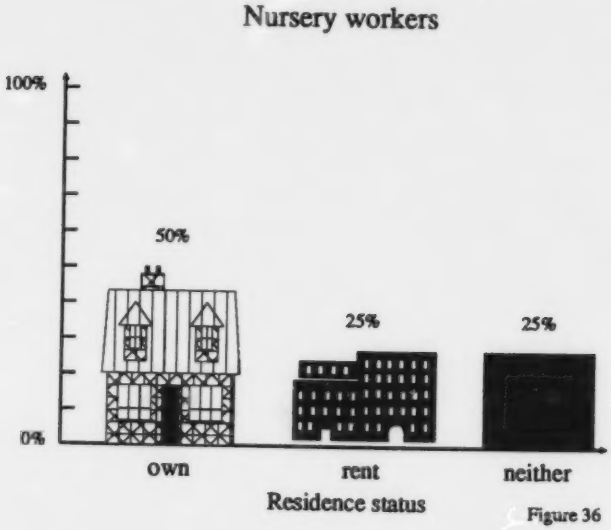
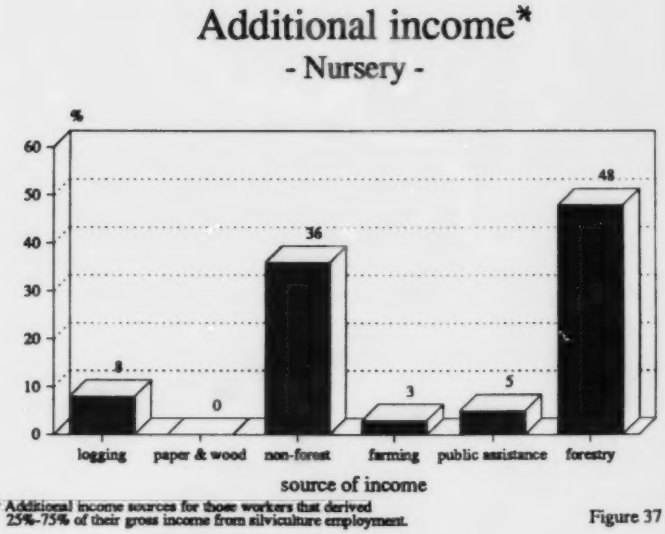


Figure 36

Gross income, silviculture income, and additional income

Most nursery workers surveyed (52%) earned a gross income (all sources) in 1988 of less than $10,000. Only 6% received a gross income of $30,000 or more. Forty-nine percent stated that none of their 1988 gross income was attributed to nursery employment. Their income was totally dependant upon sources other than nursery employment; 55% from non-forest employment, 26% from public sources, and 19% from farming and silviculture unrelated to nursery work. Only 4% of the nursery workers derived all their 1988 gross income from employment in a nursery. The remaining 47% derived additional income from other sources. Interestingly, 48% declared additional income from public sources and 36% reported additional income from non-forest sources. The remaining 16% derived additional income from farming, silviculture unrelated to nursery work, and other forest-related sources such as logging (fig 37).



* Additional income sources for those workers that derived 25%-75% of their gross income from silviculture employment.

Figure 37

Since 36% of all nursery workers were absolutely new silviculture laborers, the difference between those who secured none of their 1988 gross income from silviculture (49%) and the absolutely new entrants (36%) is 13%. These 13% are the relatively new entrants into nursery work. Relatively new entrants include workers who abstained from silviculture employment in 1988, but returned to it in 1989.

Wage types and frequency of pay

The piece rate is the most common method of payment in the Kemptville nursery where 53% of those surveyed were paid according to the number of bare-root seedlings they lifted from the plantation beds. This ensures that the seedlings will be lifted quickly. Productivity is vital given the short time for forest renewal operations. Seedlings must be delivered to forest renewal laborers whose work is constrained by biology and climate. Nursery workers who process and pack hybrid poplar stems receive hourly rates (46%). The remaining 1% were salaried. They were primarily crew chiefs, supervisors, and company employees who manage the nursery crews.

Pay distribution methods are variable. The majority (65%) were paid every two weeks, 10% weekly, and 25% upon job termination. No workers were paid monthly. Pay-out formats were essentially at the discretion of the employer.

Work hours, days and weeks

Most nursery laborers (89%) worked eight hours per day. Very few reported a work day longer than eight hours (4%); those who did worked between 9 and 10

hours. The remainder (7%) worked less than eight hours per day.

The majority (67%) worked a forty hour week from Monday to Friday but some reported a six day work week. Again, biology and climate control the number of weeks that roots can be lifted or hybrid poplar stems can be processed. In eastern Ontario, bare-root lifting is done in the spring before forest renewal operations begin and again in the fall. Processing hybrid poplar stems is done in the fall. One-half of the nursery workers were employed fewer than 4 weeks, 35% between 4 and 12 weeks, and 15% for 12 or more weeks. Possible explanations for these variations are numerous. For example, the majority of the nursery workers were hired to lift bare-root seedlings before beginning forest renewal operations and lifting must begin once the plantations beds have thawed. Also, small nursery operations require fewer person-hours than large nursery operations. Whatever the reason, employment opportunities in the Kemptville nursery were seasonal.

Silviculture labor migration

The survey reported that 46 workers were absolutely new entrants to nursery employment in 1989 (fig. 38). Seven workers were new to nursery work but came from other silviculture fields. Relatively new entrants who abstained from nursery employment in 1988 but returned in 1989 accounted for 17 workers. Fifty-seven nursery workers were veterans.

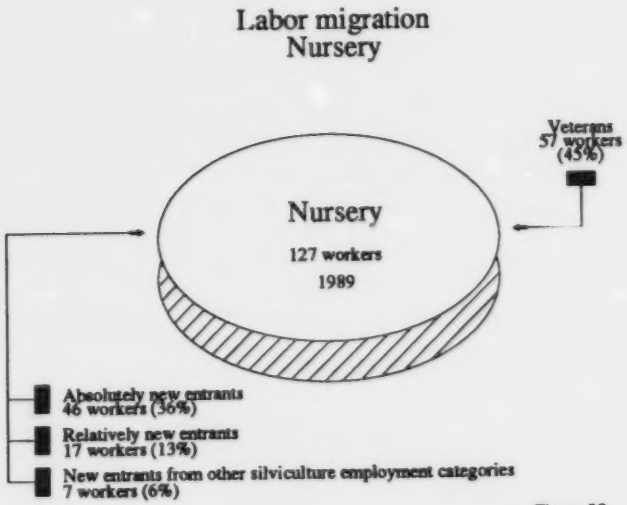


Figure 38

Employee aspirations

Overall, 81% of all nursery workers felt confident about being able to secure future employment. Only 13% were uncertain. This confidence is not surprising since many were experienced. These veterans possess a large accumulation of human resource assets in forestry education, nursery training, and experience.

Education or training demand

Fifty-six percent of all nursery workers wanted additional education or training. Forty-four percent indicated no desire for additional training. Of those wishing an additional education or training, 24% mentioned additional skills in lifting and the remaining 76% indicated site preparation and plantation tending (fig. 39).

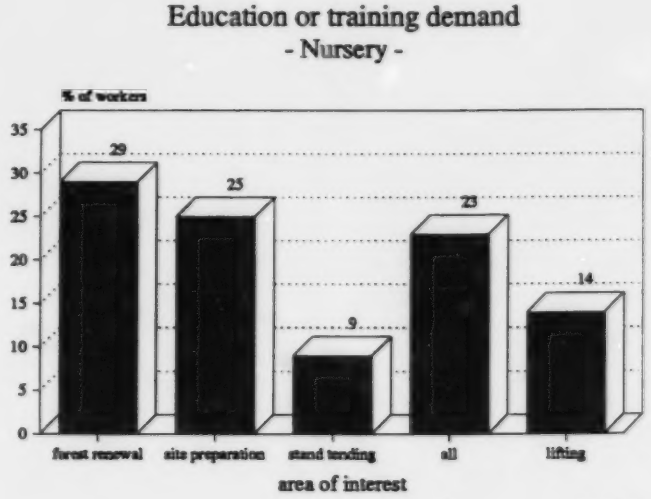


Figure 39

Worker Concerns

In answering the subjective question, respondents addressed topics from working conditions to wages (fig. 40). These responses provided a general indicator of worker morale and problems that may need attention. Not surprisingly, the seasonal nature of the job and work environment were of greatest concern. Forty percent disapproved of the short season and 35% complained of rain, warm temperatures, and contending with insect bites.

Wages were not a major issue nor did many complain about the hours of work. Remoteness did not play a significant role because the operations were located close to small towns and cities.

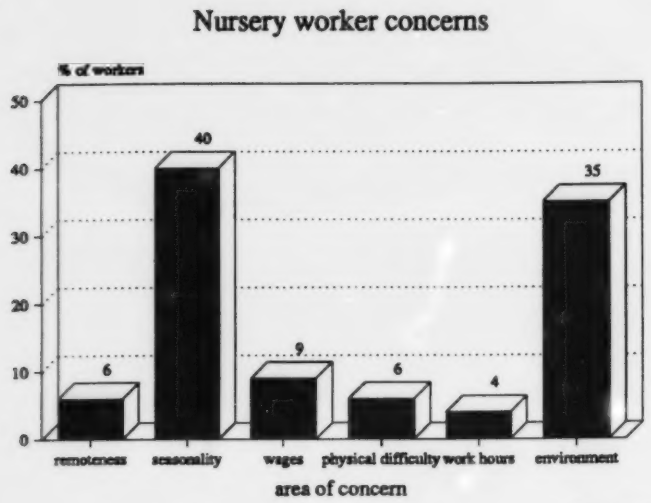
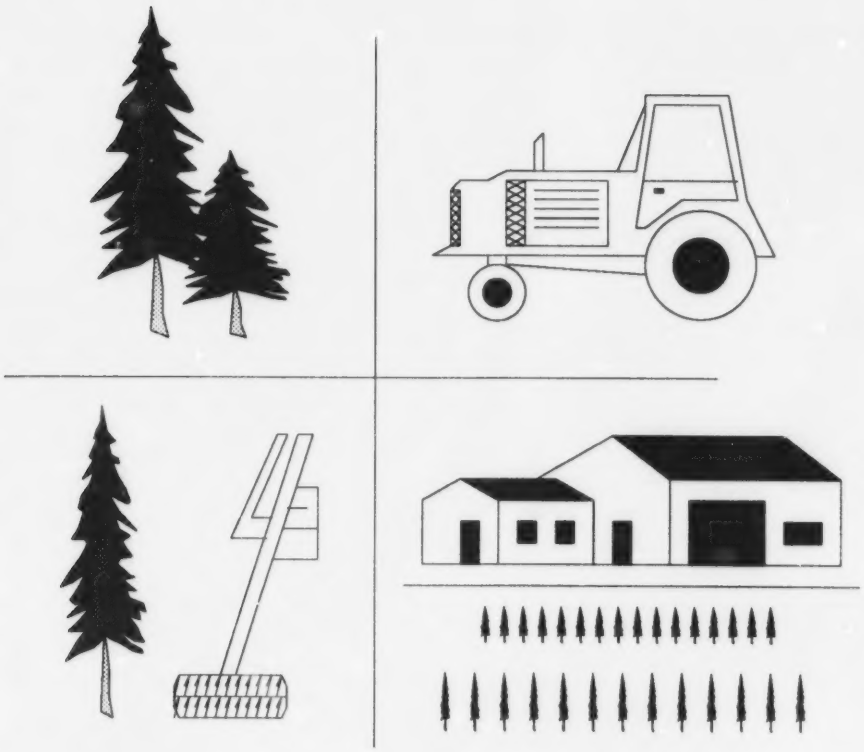

Nursery worker concerns
% of workers
50
40
30
20
10
0
6
40
9
6
4
35
remoteness
seasonality
wages
physical difficulty
work hours
environment
area of concern

Figure 40

Chapter VI



Summary / Comparison

Sex, age, and marital status

Males dominated the silviculture labor force in all job categories but the nursery where women comprised 58% of the workers. Silviculture tended to attract young workers between 15 and 24 years, principally in forest renewal and stand tending. By contrast, nursery workers were predominantly middle-aged and no age group dominated among site preparation workers.

In forest renewal, most workers were young (15 to 24) and single (never married). Fewer than half of other silviculture workers were single. Table 14 displays this information graphically.

Table 14 **Labour Demographics**

	Forest Renewal Worker	Site Preparation Worker	Stand Tending Worker	Nursery Worker
Sex	* Male dominated	* 100% male	* Male dominated	* Female Dominated
Age	* Young work force	* No dominate age class	* Young work force	* Middle aged work force
Marital Status	* 80% single (never married)	* 38% single (never married)	* 49% single (never married)	* 44% single (never married)
Child Dependencies	* 19% support children	* 29% support children	* 41% support children	* 49% support children

Child dependencies

Forest renewal workers reported the least child dependencies followed by site preparation workers. Nursery and stand tending employment groups had the most children to support. Silviculture workers without any children were mostly between 15 and 24 years. Those with children were mostly between 25 and 34 years. Of those with children, the majority supported from one to three children. The remainder supported four or more children.

Formal and forestry education

Table 15 compares the human resource assessment among the four silviculture employment groups. Silviculture workers in eastern Ontario were fairly well educated with approximately half having completed high school and about one-quarter having completed some form of post-secondary education. This dispels a concern that silviculture workers were poorly educated and that the worker supply came from high school drop-outs.

Table 15 Human Capital Assessment

	Forest Renewal Worker	Site Preparation Worker	Stand Tending Worker	Nursery Worker
Formal Education	* 55% completed high school	* 43% completed high school	* 56% completed high school	* 52% completed high school
Forestry Education	* 10% have forestry ed. * dominate type: Forestry General	* 19% have forestry ed. * dominate type: Forestry Technology	* 25% have forestry ed. * dominate type: Forestry General	* 13% have forestry ed. * dominate type: Forestry General
Silviculture Training	* 36% received training * major training source: Private	* 62% received training * major training source: Public	* 67% received training * major training source: Public	32% received training * major training source: Public
	Forest Renewal Training	Site Preparation Training	Stand Tending Training	Nursery Worker Training
	* 21% received training	* 48% received training	* 48% received training	*18% received training
Experience	* 45% no seasons of experience. * high job turnover * 22% four or more seasons of experience * labour retention problem	* 0% no seasons of experience. * low job turnover * 52% four or more seasons of experience	* 16% no seasons of experience. * low job turn over * 43% four or more seasons of experience	* 42% no seasons of experience. * high job turnover * 32% four or more seasons of experience * labour retention problem

Stand tending workers reported the highest proportion of those silviculture workers having some form of forestry education. The complexity of the work may explain why so many stand tending workers have a formal forestry education. Every timber stand requires making decisions about the method of thinning at each stage of the rotation, the timing of this thinning, and calculating the amount of growing stock that will remain after each thinning. An understanding of forestry principles was identified as a need by many stand tending workers. Supervisors and crew chiefs had the highest probability of having a forestry education.

Forest renewal workers had the lowest proportion of individuals who had an education in forestry.

Silviculture training

Silviculture training appears to be the major form of human resource investment as opposed to formal forestry education among common silviculture workers. One explanation for this could be that silviculture operations in the field require skills directly applicable to the task at hand. Theoretical and planning skills acquired through formal forestry education were necessary among individuals such as supervisors responsible for developing forest management plans. Many supervisors had a combination of forestry education and silviculture training.

Forest renewal training was taught primarily by private silviculture operators. Much of this training was taught through formal programs but some workers learned by doing, observing others, and being reprimanded for mistakes. Formal site preparation and stand tending training were taught primarily by public silviculture operators such as the Ontario Ministry of Natural Resources. This training was offered by individuals certified in handling special equipment and was usually provided on demand. Nursery training, in particular seedling lifting, was offered by the province. Again, training varied from formal programs to the simplest demonstration. In all, silviculture training transfers easily to other silviculture operators.

Training and the need for training varied among employment categories. Site preparation and stand tending workers tended to have a higher proportion of workers with training compared to forest renewal and nursery workers. The technical ability required to operate a variety of equipment in site preparation and stand tending could explain the higher incidence of training among these workers.

Forest renewal and nursery workers had fewer trained workers probably because these occupations involved less technical processes and more manual operations. However with more stringent demands for quality control on regeneration and plantation sites, the need for highly trained workers is acute to reduce seedling mortality and forest management costs. Although manual operations dominate forest renewal and nursery operations, training can play a vital role to reduce physical injury and improve nutritional habits. Beliefs that silviculture workers require little beyond a strong back and a willingness to work are quite out of date.

Silviculture experience

The forest renewal group had the highest percentage of workers with no experience. This may be explained by high job turnover rates in this physically demanding, monotonous work, which is subject to a variety of weather conditions.

All site preparation workers reported at least one season of experience in preparing the soil for a new crop of trees. This situation may be an anomaly; however, the skills required for the job and the capital outlay necessary for the special equipment may deter potential candidates. A low job turnover rate and a high percentage of workers with experience may also explain why new entrants were not needed and therefore non-existent.

Only a few stand tending workers reported no experience, implying that only a handful of workers were new to the category. It appears that many of the same silviculture workers return every year to preform stand tending operations. Their return also could be explained by the amount of training required. For example, stand tending workers must be certified in the use of a chain saw or they may be prohibited from working on Crown land. A low job turnover rate and a high percentage of workers with experience may also explain the low number of new entrants.

A high percentage of nursery workers reported no experience in seedling lifting. These workers are absolutely new entrants into the nursery employment category. A high job turnover is a plausible explanation because seedling lifting is labor intensive requiring manual dexterity, physical stamina, and patience for repetitive movements. Another factor that may influence the number of new entrants could be changes in the demand for nursery stock.

Human resource assessment

The pool of qualified silviculture workers in eastern Ontario is insufficient due to a lack of silviculture training, forestry education, and/or field experience. The lack of qualified silviculture workers can be linked to poor worker performance which can lead to rising forest management costs, poor stand performance, high job turnover rates, and a perception that silviculture employment is short term. Obstacles

such as seasonal employment and arduous work in difficult environments have led to the absence of a pool of qualified silviculture workers. A comprehensive silviculture worker certification program is one approach that could help to solve this problem.

A silviculture worker certification program would develop labor quality standards to which workers could aspire. Specific objectives would be vital. For example, goals could include raising productivity, occupational health and safety awareness, or teaching specific skills. The human resource assessment of this study could provide a base against which to measure any improvements in the quality of the labor force after implementing such a program.

Defining required silviculture skills in the context of forestry education, silviculture training, and field experience allows development of labor quality standards based on some combination of the three. Gaps between the labor quality of the working population and the predetermined labor quality standard could be identified. This gap would serve to confirm the desired labor quality standard as a realistic goal and show the amount of effort and resources necessary to move the labor force to the certifiable labor quality standard. The results of this labor force survey in eastern Ontario provides a unique opportunity to evaluate the human resource worth of silviculture workers against a predetermined labor quality standard.

Worker certification could ensure a sustained pool of qualified silviculture workers. Certified workers could become employable for longer periods of time. In addition, these workers could potentially earn higher wages and greater income with their increased skills. Moreover, trained workers are able to cope better with working in a sometimes difficult environment and reduce injuries Finally, one could expect a reduction in job turnover rates.

Gross income, silviculture income, and additional income

Table 16 compares income sources among the four silviculture groups. The survey showed that at least half of all forest renewal and nursery workers had gross incomes (all sources) in 1988 of less than $10,000. In some instances these workers were students who entered the labor force to earn income for continuing their education. Approximately one-quarter of the site preparation and stand tending workers had incomes of less than $10,000. Very few workers had incomes in excess of $30,000.

Table 16

	Income			
	Forest Renewal Worker	Site Preparation Worker	Stand Tending Worker	Nursery Worker
Gross Income (all sources) 1988	• 65% < $10,000 • 2% > $30,000	• 20% < $10,000 • 4% > $30,000	• 23% < $10,000 • 8% > $30,000	• 52% < $10,000 • 6% > $30,000
Percentage of Gross Income From Work In Silviculture 1988	• 53% derived no income from silviculture • 5% derived all income from silviculture	• 5% derived no income from silviculture • 33% derived all income from silviculture	• 33% derived no income from silviculture • 6% derived all income from silviculture	• 19% derived no income from nursery • 4% derived all income from nursery
Additional Income Source 1988	• public assistance: 39% • non-forestry: 51% • forest production: 4%	• public assistance: 29% • non-forestry: 29% • forest production: 13%	• public assistance: 25% • non-forestry: 61% • forest production: 5%	• public assistance: 36% • non-forestry: 46% • forest production: 4%
Residence Status	• mostly rent	• mostly own	• mostly rent	• mostly own

A large percentage of forest renewal and stand tending workers derived no income from working in silviculture in 1988. Some silviculture workers were absolutely new entrants and others were relatively new. One-third of the site preparation workers earned all of their income in silviculture employment; this was true for only very few workers in other groups.

Non-forestry related employment was the major source of additional income for workers who supplemented their silviculture income. Public assistance was the second major source. Additional income from forest production was low and farming for additional income was limited to site preparation workers.

Employment contribution

The silviculture labor force has contributed substantially to the economy of eastern Ontario both in number of jobs generated and in income produced (fig. 41).

Silviculture labor force
by employment group

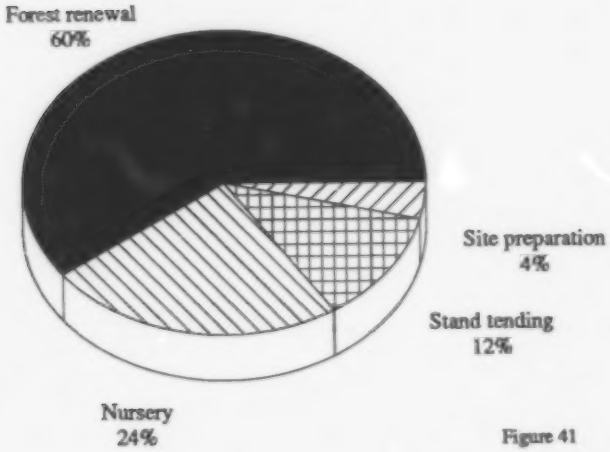


Figure 41

Forest renewal was the largest silviculture labor group with 319 workers. Nursery workers were next with 127. Stand tending had 63 workers, and site preparation was the smallest with 21 workers.

Forest renewal made the largest contribution to the eastern Ontario economy. Workers earned approximately one-half a million dollars in 1988. This was estimated by multiplying the average piece wage of ten cents per planted seedling by the 5,385,868 seedlings planted. More than 80% of these workers live in eastern Ontario and it is reasonable to assume that these workers spent a large percentage of their income on goods and services within this region.

Wages and hours of work

Table 17 compares the types of wages, the length of day, the length of the work week and employment duration among the four worker groups.
Forest renewal and nursery workers primarily worked for piece rates while site preparation and stand tending workers mostly worked by the hour. Workers in all four groups mostly worked for eight or more hours each day and forty or more hours per week. Most stand tending workers had more than 12 weeks work per season. Forest renewal and site preparation workers mostly worked between four and eight weeks; nursery workers mostly worked less than four weeks.

Table 17 Hours of Work & Wages

	Forest Renewal Worker	Site Preparation Worker	Stand Tending Worker	Nursery Worker
Wage Type	* majority piece rate	* majority hourly rate	* majority hourly rate	* majority piece rate
Work Day	* majority > 8 hrs.	* majority > 8 hrs.	* majority 8 hrs.	* majority 8 hrs.
Work Week	* majority > 40 hrs.	* majority > 40 hrs.	* majority 40 hrs.	* majority 40 hrs.
Employment Duration	* 4-8 weeks	* 4-8 weeks	* > 12 weeks	* less than 4 weeks

Employee outlook

All silviculture employment groups, except forest renewal, felt confident about being able to secure future employment in silviculture given their present skills and experience. Many site preparation, stand tending, and nursery workers are veterans and have accumulated both education and training.

Silviculture education and training

Stand tending workers indicated the strongest desire for additional training. The lowest demand came from nursery workers. Of those who demanded additional training, they requested it in all aspects of silviculture. This highlights the desire for many silviculture workers to become multiskilled.

Worker concerns

Workers reported that contending with rain, high temperatures, and insects were major negative aspects of the working environment. Short term or seasonal employment was also a concern. Wages were not a major issue, nor were remoteness or the hours of work.

Glossary

Forestry management services industry	those primarily engaged in silviculture, forest access, forest protection, and forest planning and development. Establishments engaged in the harvesting and refining of forestry benefits are excluded.
Forestry management services labor force	those individuals 15 years or over employed in silviculture, forest access, forest protection, or forest planning and development during a specific forest management season. This includes those employed in any combination of these activities. Logging, pulp and paper, and other forest mill workers are excluded.
Forest renewal activities	forest crops through artificial reforestation (sowing seeds or planting) and natural regeneration (modified harvest).
Nursery work	producing seedling, seed, and cuttings necessary to establish a new forest crop.
Nursery training	instruction in planting, bed preparation, seedling tending, seedling lifting, and other activities necessary to supply growing stock to establish a new forest crop.
Silviculture	the art of producing and tending a forest.
Silviculture labour force	the group of individuals 15 years or over employed in forest renewal, site preparation, stand tending, or nursery operations during a specific forest management season including those employed in any combination of these activities. Logging, pulp and paper, and other forest mill workers are excluded.
Silviculture training	instruction in forest regeneration activities necessary to grow and tend a new tree crop. Training can be in site preparation, forest renewal, and/or stand tending.
Silviculture workers	publicly or privately employed individuals 15 years or over who receive pay or profit from providing services in forest renewal, site preparation, stand tending, or nursery operations during a specific forest management season, including those employed in any combination of the these activities.
Site preparation	activities necessary to prepare the soil for a new crop of trees through the disposal of woody debris and reduction of harvested vegetation.
Stand tending	activities necessary to care for an established timber stand at any stage in its life.

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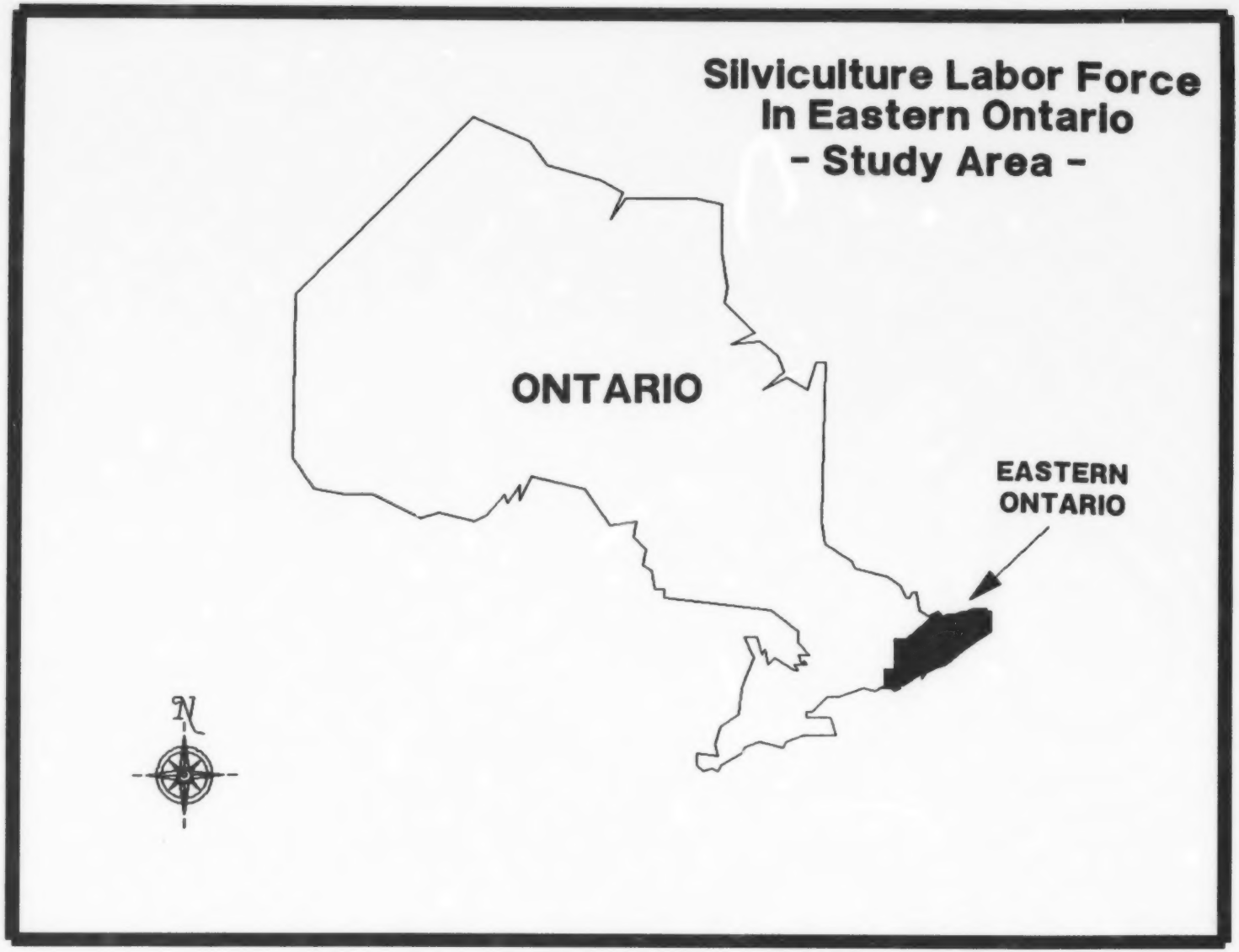
Appendix A

- Map -


Silviculture Labor Force
In Eastern Ontario
- Study Area -
ONTARIO
EASTERN
ONTARIO
N

Appendix B

- Summary Tables -

The silviculture labor force in eastern Ontario – A socio-economic profile – (1989)

Sex Distribution

Sex	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Male	256	80	21	100	62	98	53	42
Female	63	20	0	0	1	2	74	58
Total	319	100	21	100	63	100	127	100

Age Distribution

Age Group	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
15 - 24	204	64	6	29	20	32	39	31
25 - 34	83	26	6	29	24	38	42	33
35 - 44	23	7	1	4	9	14	29	23
45 - 54	4	1	4	19	3	5	10	8
55 +	5	2	4	19	7	11	7	5
Total	319	100	21	100	63	100	127	100

Marital Status

Status	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Married	50	16	13	62	29	46	61	48
Widowed, Divorced	14	4	0	0	3	5	10	8
Single	255	80	8	38	31	49	56	44
Total	319	100	21	100	63	100	127	100

The silviculture labor force in eastern Ontario
– A socio-economic profile – (1989)

Dependent Children

Children	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
none	259	81	15	71	37	59	65	51
1	19	6	3	14	12	19	20	16
2	25	8	0	0	7	11	28	22
3	12	4	2	10	5	8	10	8
4 or more	4	1	1	5	2	3	4	3
Total	319	100	21	100	63	100	127	100

Residence Location

Location	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Village	47	15	2	9	14	22	19	15
Town	69	22	1	5	9	14	39	31
City	126	39	0	0	14	22	12	9
Rural	51	16	8	38	17	28	35	28
Farm	26	8	10	48	9	14	22	17
Total	319	100	21	100	63	100	127	100

The silviculture labor force in eastern Ontario – A socio-economic profile – (1989)

Formal Education

Education	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Elementary	22	7	8	38	11	17	23	18
High School	178	55	9	43	35	56	66	52
Tech., Trade or College	51	16	4	19	14	22	23	18
University	66	21	0	0	3	5	12	10
Graduate Studies	2	1	0	0	0	0	3	2
Total	319	100	21	100	63	100	127	100

Source of Silviculture Training

Source	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Government	19	17	10	76	28	66	19	46
Company	72	63	1	8	12	29	15	37
At Home	10	9	1	8	2	5	2	5
Other	13	11	1	8	0	0	5	12
Total	114	100	13	100	42	100	41	100

The silviculture labor force in eastern Ontario
– A socio-economic profile – (1989)

Seasons of Experience

Seasons	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
none	143	45	0	0	10	16	53	42
1 to 3	107	33	10	48	26	41	33	26
4 to 6	37	12	3	14	10	16	13	10
7 to 9	11	3	2	9	2	3	8	6
10 or more	21	7	6	29	15	24	20	16
Total	319	100	21	100	63	100	127	100

Residence Status

Status	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Own	71	22	11	52	28	44	64	51
Rent	141	44	2	10	22	35	32	25
Other	107	34	8	38	13	21	31	24
Total	319	100	21	100	63	100	127	100

The silviculture labor force in eastern Ontario – A socio-economic profile – (1989)

Gross income in 1988 from all sources

Income	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
less than $5,000	94	29	2	10	7	11	31	24
$5,000-$9,999	116	36	2	10	8	13	35	28
$10,000-$19,999	75	25	7	33	23	36	36	28
$20,000-$29,999	27	8	9	43	20	32	18	14
$30,000 or more	7	2	1	4	5	8	7	6
Total	319	100	21	100	63	100	127	100

Percentage of gross income in 1988 attributed to working in silviculture

Percentage	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
0%	168	53	1	5	21	33	62	49
25%	54	17	5	24	12	19	34	27
50%	43	13	3	14	11	18	10	8
75%	37	12	5	24	15	24	15	12
100%	17	5	7	33	4	6	6	4
Total	319	100	21	100	63	100	127	100

The silviculture labor force in eastern Ontario
– A socio-economic profile – (1989)

Additional income sources for 1988

Source	Forest Renewal Worker (FRW) 1		Site Preparation Worker (SPW) 2		Stand Tending Worker (STW) 3		Nursery Worker (NUW) 4	
	#	%	#	%	#	%	#	%
Logging	9	6	1	8	3	8	5	8
Paper and Wood	1	1	0	0	0	0	0	0
Non-Forest	64	48	3	23	20	53	21	36
Farming	8	6	4	31	2	5	2	3
Forestry (a)	n/a	n/a	n/a	n/a	n/a	n/a	3	5
Public Funds	52	39	5	38	13	34	28	48
Total	134	100	13	100	38	100	59	100

Forestry(a) * refers to silviculture employment that is non-nursery related and pertain to the growing and tending of a new forest crop.

Columns(1,2,3) * Additional income sources for those workers that derived between 25 and 75% of their gross income from silviculture employment.

Column(4) * Additional income sources for those workers that derived between 25 and 75% of their gross income from nursery employment.

Wage Type

Type	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Hourly Rate	77	24	18	86	42	67	58	46
Piece Rate	231	72	1	5	7	11	67	53
Salary	11	4	2	9	14	22	2	1
Total	319	100	21	100	63	100	127	100

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Frequency of Pay

Frequency	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Weekly	65	20	4	19	11	17	12	10
Bi-Weekly	116	36	14	67	49	78	83	65
Monthly	5	2	1	5	2	3	0	0
Termination of Job	133	42	2	9	1	2	32	25
Total	319	100	21	100	63	100	127	100

Hours of Work

Hours	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
less than 8 hrs	45	14	4	19	6	10	9	7
8 hrs	135	42	7	33	47	75	113	89
more than 8 hrs	139	44	10	48	10	15	5	4
Total	319	100	21	100	63	100	127	100

Work Week

Hours	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
less than 40 hrs	53	17	3	14	6	10	34	27
40 hrs	89	28	8	38	46	73	85	67
more than 40 hrs	177	55	10	48	11	17	8	6
Total	319	100	21	100	63	100	127	100

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Length of Employment

Length	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
less than 4 wks	110	35	1	4	4	6	63	50
4 to 8 wks	132	41	8	38	18	29	41	32
9 to 12 wks	60	19	6	29	7	11	4	3
more than 12 wks	17	5	6	29	34	54	19	15
Total	319	100	21	100	63	100	127	100

Worker Concerns

Concern	Forest Renewal Worker (FRW)		Site Preparation Worker (SPW)		Stand Tending Worker (STW)		Nursery Worker (NUW)	
	#	%	#	%	#	%	#	%
Remoteness	32	10	0	0	3	5	8	6
Seasonality	68	20	10	48	23	36	51	40
Wages	28	9	2	9	3	5	11	9
Phys. Difficulty	44	14	1	5	5	8	7	6
Hours of Work	24	8	0	0	0	0	5	4
Environmental Conditions	123	39	8	38	29	46	45	35
Total	319	100	21	100	63	100	127	100